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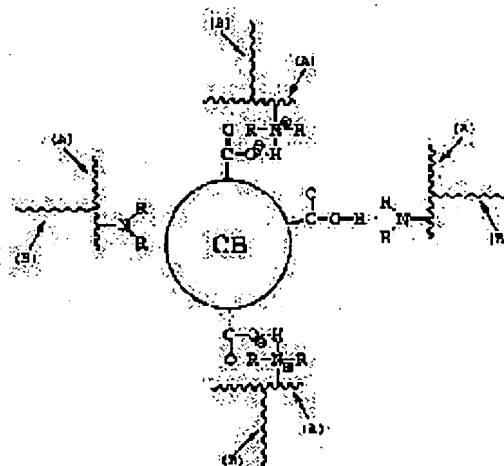
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(54) CARBON-BLACK-COMPOSITED POLYMER, ITS PRODUCTION AND ITS USE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a novel carbon-black-composited polymer having excellent dispersibility in various media in spite of its high carbon black content, excellent electrical insulation properties and sensitivity to light and heat.

SOLUTION: There is provided a carbon-black-composited polymer obtained by dispersing carbon black in a block or graft polymer comprising segments (A) having amino, amido and/or nitrile groups and segments (B) having a structure different from that of segment A, wherein in the final state of the carbon-black-composited polymer, segments (A) and/or segments (B) have groups (II) reactive with the matrix being an



objective medium to be compounded with the carbon-black-composited polymer.

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CLAIMS

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[Claim(s)]

[Claim 1] The carbon black compound polymer which is made to carry out mixed distribution of the polymer of the block which consists of a segment (B) of different structure from the segment (A) which has the amino group, an amide group, and/or a nitrile group, and said segment (A), or a graft mold, and the carbon black, and is obtained.

[Claim 2] The carbon black compound polymer according to claim 1 characterized by having the radical (II) on which said segment (A) and/or (B) have the matrix of the purpose medium which blends this carbon black compound polymer, and reactivity.

[Claim 3] The carbon black compound polymer according to claim 2 characterized by being at least one sort or two sorts or more of things chosen from the group which said radical (II) becomes from a partial saturation double bond radical, a carboxyl group, and an alkoxy silyl radical.

[Claim 4] The carbon black compound polymer of any one publication of claim 1-3 which is what has at least one sort or two sorts or more of things chosen from the group which said segment (B) becomes from polysiloxane system structure, the Pori (meta) acrylic structure, polyether structure, Pori (meta) acrylonitrile structure, polyester structure, polyalkylene structure, polyamide structure, polyimide structure, polyurethane structure, and fluororesin structure.

[Claim 5] said segment (A) -- amino alkyl (meta) acrylate -- more than 0.5 mol % -- the carbon black compound polymer of any one publication of claim 1-4 obtained by the polymerization of the included vinyl system monomer constituent.

[Claim 6] The manufacture approach of the carbon black compound polymer characterized by to carry out mixed distribution of the polymer of the block which has the segment (A) which has the amino group, an amide group, and/or a nitrile group, and the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid under existence of the dispersion-medium liquid which consists of a medium which has the purpose medium or the description near this, or a graft mold, and the carbon black.

[Claim 7] Under existence of the dispersion-medium liquid which consists of a medium which has the purpose medium or the description near this The segment which has the amino group, an amide group, and/or a nitrile group (A), It has the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid. And the polymer of the block which comes to contain in said segment (A) and/or segment (B) the radical (II) which has the matrix of the purpose medium, and reactivity, or a graft mold, The manufacture approach of the reactant carbon black compound polymer characterized by carrying out mixed distribution of the carbon black.

[Claim 8] a) Under existence of the dispersion-medium liquid which consists of a medium which has the purpose medium or the description near this The segment which has the amino group, an amide group, and/or a nitrile group (A), The block which has the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid, or the precursor polymer of a graft mold, The manufacture approach of the carbon black compound polymer which carries out mixed distribution of the carbon black beforehand, and is characterized by subsequently to the precursor polymer of the b

aforementioned block or a graft mold introducing the radical (II) which has the matrix of the purpose medium, and reactivity.

[Claim 9] a) Under existence of the dispersion-medium liquid which consists of a medium which has the purpose medium or the description near this The segment which has the amino group, an amide group, and/or a nitrile group (A), The precursor polymer which has the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid, and has the functional group (III) in which the functional group on the front face of carbon black does not have reactivity substantially, Carry out mixed distribution of the carbon black beforehand, and subsequently a compound (d) with the radical (II) which has the functional group (III) which the precursor polymer of the b aforementioned block or a graft mold has, the reactant radical (IV) which can react, the matrix of the purpose medium, and reactivity The manufacture approach of the carbon black compound polymer characterized by making it react to the carbon black obtained by said a, and introducing said radical (II) into a precursor polymer.

[Claim 10] The manufacture approach of the carbon black compound polymer characterized by carrying out mixed distribution of the polymer of the block which has the segment (A) which has the amino group, an amide group, and/or a nitrile group, and a segment (B) with the compatibility lower than said segment (A) over carbon black, or a graft mold, and the carbon black.

[Claim 11] The manufacture approach of the carbon-black compound polymer characterized by to carry out mixed distribution of the polymer of the block which comes to contain the radical (II) which has the segment (A) which has the amino group, an amide group, and/or a nitrile group, and a segment (B) with the compatibility lower than said segment (A) over carbon black, and has the matrix of the purpose medium, and reactivity in said segment (A) and/or segment (B), or a graft mold, and the carbon black.

[Claim 12] a) the precursor polymer of the block which has the segment (A) which has the amino group, an amide group, and/or a nitrile group, and a segment (B) with the compatibility lower than said segment (A) over carbon black, or a graft mold, and carbon black -- mixed distribution -- carrying out -- subsequently -- b -- the manufacture approach of the carbon-black compound polymer characterized by to introduce into the precursor polymer of said block or a graft mold the radical (II) which has the matrix of the purpose medium, and reactivity.

[Claim 13] The black thermosetting resin constituent characterized by coming to blend a carbon black compound polymer according to claim 1 to 5 with a thermosetting resin constituent.

[Claim 14] The black photo-setting resin constituent characterized by coming to blend a carbon black compound polymer according to claim 1 to 5 with a photo-setting resin constituent.

[Claim 15] The black photo-setting resin constituent according to claim 15 whose molecular weight of said segment (B) of said carbon black compound polymer is 500 or more.

[Claim 16] The black photo-setting resin constituent according to claim 14 or 15 characterized by coming to blend alkali meltable mold resin into said photo-setting resin constituent.

[Claim 17] The black matrix for color filters characterized by being formed with the black photo-setting resin constituent of any one publication of claim 14-16.

[Claim 18] The resistance regulator which comes to contain a carbon black compound polymer according to claim 1 to 5.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of a carbon black content resin constituent at the manufacture approach of a carbon black compound polymer, the carbon black compound polymer obtained by this and its application, and a list. It is related with the manufacturing technology of the new carbon black compound polymer characterized by the ability to react to carbon black in more detail with the matrix of the purpose media, such as making the polymer of a block or a graft mold compound-ize, and a binder. The carbon black compound polymer of this invention A resin constituent, a covering constituent, Ink, thermal-ink-transfer-printing ink, the ink ribbon coat agent for thermal ink transfer printing, the back coat agent for magnetic-recording media, The ingredient, the black matrix of the color filter for liquid crystal which need the toner for electrostatic-charge development, a coating, high resistance, and protection-from-light nature, A modifier thru/or the bulking agents and resistance regulators of plastics-less \*\* rubber, such as coloring agents, such as an artificial marble, plastics, or a rubber molding material, polyolefine, and polyester, It can use to a planar heating element, lubricant, a traction drive fluid, an electroviscous fluid, a non-linear optical material, etc., and can use for various thermosetting and photoresist constituents useful especially.

[0002]

[Description of the Prior Art] Since carbon black is excellent in coloring nature, conductivity, weatherability, chemical resistance, etc., it is broadly used for the various purpose, such as a reinforcing agent, a bulking agent, etc. of plastics or an elastomer. However, since the configuration of carbon black is [ being powder or ] granular, it is few, and liquids, such as a base material of solid states, such as rubber and resin, or water, and a solvent, distribute at homogeneity, and being used independently usually demonstrates the property. However, carbon black was very difficult to compare with the cohesive force between particles, and to mix or distribute to homogeneity on the usual mixing or distributed conditions, since compatibility with other matter, for example, an organic macromolecule, water, an organic solvent, etc. is weak. In order to solve this problem, many examination which improves the dispersibility of carbon black is made by covering a carbon BURA@KKU front face with various kinds of surfactants and resin, and raising compatibility with a solid state or a liquefied base material.

[0003] By choosing the class of polymerization nature monomer suitably, since the carbon black graft polymer obtained by carrying out the polymerization of the polymerization nature monomer to the bottom of carbon black coexistence can change a hydrophilic property and/or oleophilic suitably, it attracts attention (for example, JP,42-22047,B, JP,44-3826,B, JP,45-17248,B, JP,46-26970,B). However, the yield of the carbon black graft polymer obtained by these approaches was as low as several % - about ten%, most existed in the form of a vinyl system homopolymer, and the surface treatment effectiveness of carbon black was very low. For this reason, the compatibility with other matter was not improved at the expected degree, but the case where a distributed condition changed with mixing or distributed conditions had it plentifully.

[0004] In order to solve this trouble, the carbon black graft polymer which the polymer which has reactant radicals, such as an epoxy group and an aziridine radical, in intramolecular is made to react with carbon black, and is obtained is proposed (JP,2-24868,B, JP,6-27269,B), and the dispersibility to the matter of various kinds [ graft polymer / this / carbon black ] was improved.

[0005] However, this carbon black graft polymer Although this polymer had the functional group which has reactivity with carbon black, since the polymerization chain was what has only the property of either oleophilic or a hydrophilic property, It was difficult to fully satisfy the both sides of a conflicting requirement in the case of many of fields of the graft efficiency to carbon black, and fields of the improvement in dispersibility to the various purpose media which it is going to give with the graft-ized polymerization chain concerned.

[0006] So, it had the trouble which cannot give sufficient dispersibility for a silicone system solvent, the low medium of a polarity, for example, hydrocarbon system solvents, such as the high medium of b polarity which cannot enlarge the carbon content in a this carbon black graft polymer, for example, alcohol, and Cellosolve Solvent, that graft-izing in c organic solvent was difficult etc. Therefore, this carbon black graft polymer could not use [ which receives application-constraint ] for the application it is wished an application to the application expected for carbon black contents, such as a black matrix for i liquid crystal color filters, to be large that electric insulation, such as ii electroviscous fluid, encapsulant for semiconductor devices, etc. which cannot be used, is large.

[0007] Furthermore, with a binder, there was a problem that reinforcement was insufficient harder [ which it is distributing only with mere compatibility ] by that a final product is thermally unstable or high restoration, the conventional carbon black dispersing element, for example, carbon black masterbatch.

[0008] Although the color filter used for a color liquid crystal display etc. has as a pixel the detailed field colored at least two or more sorts of pigmented layers, in order that it may intercept the light between this pixel and may raise the contrast of the displayed image, the black matrix is formed conventionally.

[0009] Such a black matrix usually consists of metal thin films, such as Cr, nickel, aluminum, etc. which consist of a detailed pattern on a glass substrate, and is formed by carrying out patterning of the metal thin film deposited on the substrate by vacuum deposition, the spatter, the vacuum forming-membranes method, etc. using a photolithography technique.

[0010] However, since the black matrix manufactured by doing in this way has the high manufacturing cost, the problem that the cost of the color filter using this itself will also become high has produced it from the complicatedness of the process.

[0011] When the color filter which has the black matrix which furthermore used these metal thin films, such as Cr, for the transparency mold display is carried and strong outdoor daylight shines upon a filter since the reflection factor of a surface of metal is high, the reflected light has also produced strongly the problem of reducing display quality remarkably.

[0012] On the other hand, in order to solve the trouble of a black matrix using the above metal thin films, the approach of forming a black matrix with the resin constituent containing a coloring agent is advocated variously.

[0013] For example, the approach of distributing protection-from-light material, such as carbon black, to polyimide system resin, and forming a black matrix in JP,2-239204,A using this is proposed. According to this approach, after this approach applied the polyimide system resin constituent containing protection-from-light material to a base material and dried, it applied the photoresist further, passes through the process of patterning, etching, and resist exfoliation, and was inadequate [ that there is little outdoor daylight reflection, since the thermal resistance of the polyimide system resin of a base material was high, what has high dependability was obtained, but ]. [ of simplification of a process and the field of cost reduction ]

[0014] Moreover, after blending black pigments, such as carbon black, into a photo-setting resin constituent, applying this photo-setting resin constituent to a base material and drying, the attempt which is going to expose and make stick and develop the mask of a predetermined pattern, and is going to form

the black matrix of a predetermined pattern is also made.

[0015] However, in order to obtain protection-from-light nature sufficient as a black matrix Since [ which is the need at hardening of a photo-setting resin when the loadings of carbon black are increased ] the permeability of the light of the ultraviolet area around 400nm falls very much, for example, In order that it may become very difficult to perform photo-curing and carbon black might catch further the radical generated from the photopolymerization initiator by ultraviolet rays, photopolymerization was checked and 10 minutes in economical light exposure were difficult for pixel formation. Moreover, if the addition of carbon black increases, the coat obtained will become conductivity and will become what cannot be used any longer as black matrices, such as a liquid crystal display. In addition, carbon black was very difficult to also set in the above photo-curing resin constituents, and to mix or distribute to homogeneity, since compatibility with other matter, for example, an organic macromolecule, water, an organic solvent, etc. is weak compared with the cohesive force between particles, and it was also difficult to obtain stability and a uniform black layer.

[0016] It is proposed that the organic pigment of the lot of a different color which presents black with combination is used, the increment in a carbon black addition when obtaining predetermined protection-from-light nature tends to be controlled, and decline in the permeability of the light of the ultraviolet area needed for photo-curing by this tends to be suppressed, and it is going to maintain the insulation of a coat with carbon black in JP,4-63870,A as a coloring agent added to a photo-setting resin constituent.

[0017] However, when the organic pigment was used together in this way, it was difficult to form the black matrix in which the light transmission nature in a visible region also becomes high, and has protection-from-light nature sufficient in low thickness as compared with the case where only carbon black is used, and was what is not solved at all about the problem of the dispersibility of carbon black which was described above, and the problem of the photo-curing inhibition by the radical prehension by carbon black.

[0018] By the way, about improving the dispersibility of carbon black, examination which covers a carbon black front face with various kinds of surfactants and resin, and raises compatibility with a solid state or a liquefied base material is not restricted to application to such a photo-setting resin constituent, but is made conventionally. [ many ]

[0019] For example, by choosing the class of polymerization nature monomer suitably, since the carbon black graft polymer obtained by carrying out the polymerization of the (1) polymerization nature monomer to the bottom of carbon black coexistence can change a hydrophilic property and/or oleophilic suitably, it attracts attention (for example, JP,42-22047,B, JP,44-3826,B, JP,45-17248,B, JP,46-26970,B).

[0020] Moreover, the carbon black graft polymer which the polymer which has reactant radicals, such as (2) epoxy groups and an aziridine radical, in intramolecular is made to react with carbon black, and is obtained is also proposed (JP,2-24868,B, JP,6-27269,B).

[0021] However, the yield of the carbon black graft polymer obtained by the approach of the above (1) was as low as several % - about ten%, most existed in the form of a vinyl system homopolymer, and the surface treatment effectiveness of carbon black was very low. For this reason, the compatibility with other matter was not improved at the expected degree, but the case where a distributed condition changed with mixing or distributed conditions had it plentifully.

[0022] Moreover, although the dispersibility to various kinds of matter was improved considerably, the carbon black graft polymer of the above (2) Although this carbon black graft polymer had the functional group in which this polymer has reactivity with carbon black, since that polymerization chain was what has only the property of either oleophilic or a hydrophilic property, It was difficult to fully satisfy the both sides of a conflicting requirement in the case of many of fields of the graft efficiency to carbon black, and fields of the improvement in dispersibility to the various purpose media which it is going to give with the graft-ized polymerization chain concerned.

[0023] So, it had the trouble which cannot give sufficient dispersibility for a silicone system solvent, the low medium of a polarity, for example, hydrocarbon system solvents, such as the high medium of b polarity which cannot enlarge the carbon content in a this carbon black graft polymer, for example,

alcohol, and Cellosolve Solvent, that graft-izing in c organic solvent was difficult etc.

[0024] The thing which comes to blend the carbon black graft polymer like the above (2) with a photo-setting resin constituent as a coloring agent is advocated as a black photo-setting resin constituent excellent in the photosensitivity suitable when acquiring the black matrix excellent in protection-from-light nature and definition for JP,6-67421,A, and distributed stability. However, since the carbon content in this carbon black graft polymer was not greatly made as described above, sufficient protection-from-light nature was not obtained, and it did not result by the level which can be satisfied also about dispersibility, and thing sufficient also about the field of the sensibility in photo-curing and the reinforcement of a hardening coat was what not becoming.

[0025] Furthermore, when such a photo-setting resin constituent performs coat formation of a black matrix etc., Although heat-treating at the temperature of about 100-300 degrees C for the purpose of raising the adhesive property of a base material and a coat (after-bake) is performed while carrying out full hardening of the coat after exposure hardening and a development After thinking that the distributed condition of the carbon black which exists in a coat in the case of this heat treatment thru/or a carbon black graft polymer changes and performing after-bake, it is observed that the resistivity of a coat falls greatly. For this reason, it was a thing inapplicable any longer as a black matrix of a liquid crystal color filter.

[0026]

[Problem(s) to be Solved by the Invention] Therefore, the purpose of this invention is to offer a new carbon black compound polymer, its manufacture approach, and its application.

[0027] While other purposes of this invention have high carbon black content, they are to offer the new carbon black compound polymer which did not check hardening of the medium concerned, could form the high intensity coat easily also as a high addition when it excelled in the dispersibility to the various media of a binder and others and added to various light thru/or a thermosetting medium, and was excellent also in many physical properties, such as electric insulation, and its manufacture approach.

[0028] Other purposes of this invention are the black charges of a coloring matter, and are to offer a cross linking agent with a new binder component.

[0029] The purpose of further others of this invention is to offer the useful carbon black compound polymer excellent in the dispersibility to various inside of a medium, such as a resin constituent, a rubber constituent, a covering constituent, ink, thermal-ink-transfer-printing ink, the ink ribbon coat agent for thermal ink transfer printing, the back coat agent for magnetic-recording media, the toner for electrostatic-charge development, a coating, a planar heating element, a resistance regulator, lubricant, a traction drive fluid, an electroviscous fluid, and a non-linear optical material.

[0030] The purpose of further others of this invention is to provide black matrix formation of a color filter with a useful photo-setting resin constituent.

[0031]

[Means for Solving the Problem] Many above-mentioned purposes are attained by following the (1) - (18).

[0032] (1) The polymer of the block which consists of a segment (B) of different structure from the segment (A) which has the amino group, an amide group, and/or a nitrile group, and said segment (A), or a graft mold, Are the carbon black compound polymer which is made to carry out mixed distribution and is obtained, and carbon black is set in the last gestalt as a carbon black compound polymer. The carbon black compound polymer characterized by having the radical (II) on which said segment (A) and/or (B) have the matrix of the purpose medium which blends this carbon black compound polymer, and reactivity.

[0033] (2) A carbon black compound polymer given in the above (1) characterized by having the radical (II) on which said segment (A) and/or (B) have the matrix of the purpose medium which blends this carbon black compound polymer, and reactivity.

[0034] (3) A carbon black compound polymer given in the above (2) characterized by being at least one sort or two sorts or more of things chosen from the group which said radical (II) becomes from a partial saturation double bond radical, a carboxyl group, and an alkoxy silyl radical.



[0035] (4) The carbon black compound polymer of any one publication of above-mentioned (1) - (2) which is at least one sort or two sorts or more of things chosen from the group which said segment (B) becomes from polysiloxane system structure, the Pori (meta) acrylic structure, polyether structure, Pori (meta) acrylonitrile structure, polyester structure, polyalkylene structure, polyamide structure, polyimide structure, polyurethane structure, and fluororesin structure.

[0036] (5) said segment (A) -- amino alkyl (meta) acrylate -- more than 0.5 mol % -- a carbon black compound polymer given in either of above-mentioned (1) - (4) obtained by the polymerization of the included vinyl system monomer constituent.

[0037] (6) The manufacture approach of the carbon black compound polymer characterized by to carry out mixed distribution of the polymer of the block which has the segment (A) which has the amino group, an amide group, and/or a nitrile group, and the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid under existence of the dispersion-medium liquid which consists of a medium which has the purpose medium or the description near this, or a graft mold, and the carbon black.

[0038] (7) Under existence of the dispersion-medium liquid which consists of a medium which has the purpose medium or the description near this The segment which has the amino group, an amide group, and/or a nitrile group (A), It has the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid. And the polymer of the block which comes to contain in said segment (A) and/or segment (B) the radical (II) which has the matrix of the purpose medium, and reactivity, or a graft mold, The manufacture approach of the carbon black compound polymer characterized by carrying out mixed distribution of the carbon black.

[0039] (8) Under existence of the dispersion-medium liquid which consists of a medium which has the a purpose medium or the description near this The segment which has the amino group, an amide group, and/or a nitrile group (A), With the precursor polymer of the block which has the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid, or a graft mold, carbon black is scattered a mixed part beforehand. Subsequently b) The manufacture approach of the carbon black compound polymer characterized by introducing into the precursor polymer of said block or a graft mold the radical (II) which has the matrix of the purpose medium, and reactivity.

[0040] (9) Under existence of the dispersion-medium liquid which consists of a medium which has the a purpose medium or the description near this The segment which has the amino group, an amide group, and/or a nitrile group (A), The precursor polymer which has the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid, and has the functional group (III) in which the functional group on the front face of carbon black does not have reactivity substantially, Carry out mixed distribution of the carbon black beforehand, and subsequently a compound (d) with the radical (II) which has the functional group (III) which the precursor polymer of the b aforementioned block or a graft mold has, the reactant radical (IV) which can react, the matrix of the purpose medium, and reactivity The manufacture approach of the carbon black compound polymer characterized by making the precursor polymer obtained by said a react to the carbon black made to graft-ize, and introducing said radical (II) into a precursor polymer.

[0041] (10) The manufacture approach of the carbon black compound polymer characterized by carrying out mixed distribution of the polymer of the block which has the segment (A) which has the amino group, an amide group, and/or a nitrile group, and a segment (B) with the compatibility lower than said segment (A) over carbon black, or a graft mold, and the carbon black.

[0042] (11) The manufacture approach of the carbon-black compound polymer characterized by carrying out mixed distribution of the polymer of the block which comes to contain the radical (II) which has the segment (A) which has the amino group, an amide group, and/or a nitrile group, and a segment (B) with the compatibility lower than said segment (A) over carbon black, and has the matrix of the purpose medium, and reactivity in said segment (A) and/or segment (B), or a graft mold, and the carbon black.

[0043] (12) The segment which has a amino group, an amide group, and/or a nitrile group (A), Mixed distribution of the precursor polymer of the block which has a segment (B) with the compatibility lower

than said segment (A) over carbon black, or a graft mold, and the carbon black is carried out.

Subsequently b) The manufacture approach of the carbon black compound polymer characterized by introducing into the precursor polymer of said block or a graft mold the radical (II) which has the matrix of the purpose medium, and reactivity.

[0044] (13) The above (1) Black thermosetting resin constituent characterized by coming to blend a carbon black compound polymer given in either of - (5) with a thermosetting resin constituent.

[0045] (14) The above (1) Black photo-setting resin constituent characterized by coming to blend a carbon black compound polymer given in either of - (5) with a photo-setting resin constituent.

[0046] (15) A black photo-setting resin constituent given in the above (15) whose molecular weight of said segment (B) of said carbon black compound polymer is 500 or more.

[0047] (16) The above (14) characterized by coming to blend alkaline soluble resin into said photo-setting resin constituent, or a black photo-setting resin constituent given in (15).

[0048] (17) The above (14) Black matrix for color filters characterized by being formed in either of - (16) with the black photo-setting resin constituent of a publication.

[0049] (18) The above (1) Resistance regulator which comes to contain the carbon black compound polymer of a publication in either of - (5).

[0050]

[Function] The "carbon black compound polymer" as used in this specification means the particle which the polymer part combined with the carbon black part by the ionicity interaction.

[0051] Carbon black usually has the particle diameter of several nm - hundreds of nm. However, since the cohesive force of particles is large, carbon black is dealt with as floc which usually has the particle diameter of several microns or more. Moreover, the cohesive force of carbon black is remarkably large compared with the compatibility of carbon black and other media, and it is very difficult to distribute carbon black in a medium by submicron one. On the other hand, a polymer part enters effectively between the particles of carbon black, and a carbon black compound polymer can weaken the cohesive force of carbon black. Furthermore, when a polymer part has a medium and compatibility, a carbon black graft polymer can be distributed in a medium by submicron one. However, though the polymer part has a medium and high compatibility If the polymer part is not effectively graft-ized by the carbon black part The property does not become the stable thing, but also brings the result that the content of the carbon black part in a carbon black graft polymer will become low if it becomes easy to produce variation again and is going to acquire the compatibility of fixed level, and constraint will be received on the application.

[0052] Although efforts have been aimed at wholeheartedly to obtain the carbon black graft polymer which has a desired property when this invention persons make carbon black come [ graft ]-izing [ a polymer part ] through covalent bond conventionally Thus, the obtained carbon black graft polymer While becoming what can demonstrate the outstanding property, carbon black and the functional group which has reactivity There was a difficulty on processes, like whenever [ considering / as they are oxazoline, an aziridine isocyanate, etc. / safety /, and stoving temperature / at the time of making it graft-ize in an epoxy group ] becomes high, and there was room of an improvement industrially again.

[0053] In the carbon black compound polymer which makes it come to combine a polymer part with carbon black by the ionicity interaction as a result of this invention persons' inquiring wholeheartedly As compared with what is depended on covalent bond which was described above, by having suitable structure for a polymer part, without being cautious of reaction temperature, so that safety can also obtain a high carbon black compound polymer and may moreover mention it later It found out that many properties, such as the dispersibility of carbon black, were fully improvable with ionic bond.

[0054] In addition, although the thing of a block type or a graft mold is used as a polymer which forms a polymer part in this invention, this is because the dispersibility which was [ rather than ] excellent to effective compound-izing and various media can be demonstrated to the carbon black of a polymer part.

[0055] For example, a segment with the compatibility high as a polymer which forms a polymer part over the purpose medium (B), It has a segment (A) with the compatibility lower than this segment (B) over the purpose medium. And the amino group which said segment (A) can combine with carbon black

by the ionicity interaction, A molecular design is carried out so that it may have an amide group and/or a nitrile group, and mixed distribution is carried out in the dispersion-medium liquid which consists of a medium with the purpose medium or the description (polarity) near this.

[0056] Drawing 1 is drawing showing typically the condition [ / near the carbon black front face at the time of carrying out mixed distribution of the polymer of the block type which has the amino group, amide group, and/or nitrile group which were described above to carbon black in the dispersion-medium liquid which consists of a medium which has the purpose medium or the description near this as mentioned above, or a graft mold ]. Since a polymer is what consists of a segment (A) which has the amino group, an amide group, and/or a nitrile group, and a segment (B) which has compatibility to the purpose medium as described above, In order to carry out orientation in the system of reaction so that it may illustrate, and it may become the form where the segment (B) had been extended [ be / it / under / dispersion-medium liquid / other side ], A segment (A) encloses a carbon black particle front face inevitably, and since a suitable place for carbon black and this polymer to compound-ize by ionic bond is offered, effective compound-ization is made.

[0057] Since orientation of the graft chain combined with the carbon black particle front face in the carbon black compound polymer obtained by this is carried out so that a segment with the high compatibility over the purpose medium (B) may be outside exposed, high compatibility is shown to the purpose medium and a carbon black compound polymer can be distributed in a medium per submicron one.

[0058] Or carbon black may be made to compound-ize the block or graft mold polymer which does not have substantially the segment (A) which has the amino group, an amide group, and/or a nitrile group, and said amino group, and has a segment (B) with the compatibility lower than said segment (A) over carbon black (it has a segment with high compatibility (B) to the high segment (A) and the purpose medium of compatibility to carbon black if it puts in another way) from the same view again.

[0059] In the system of reaction, in order that the segment (A) of this polymer may carry out orientation to a carbon black side, the amino group, amide group, and/or nitrile group which exist in the segment (A) concerned combine with the carboxyl group on the front face of carbon black etc. by the ionicity interaction more effectively. Since orientation of the graft chain combined with the front face in the carbon black compound polymer obtained by this is carried out so that a segment with the high compatibility over the purpose medium (B) may be outside exposed, high compatibility is shown to the purpose medium and a carbon black compound polymer can be distributed in a medium per submicron one. In addition, in the dispersion-medium liquid which consists of a medium which compatibility is not necessarily in a segment (B) unlike the aforementioned case, thru/or has the purpose medium or the description near this in this case Although it is possible to make it react in the dispersion-medium liquid in which it is not necessary to perform graft-ization and compatibility almost equivalent to both a segment (A) and a segment (B) in carrying out melting kneading only of this polymer and the carbon black is shown In order to make it compound-ize more certainly and efficiently, it is desirable to carry out in the dispersion-medium liquid which has compatibility in a segment (B).

[0060] Thus, the carbon black compound polymer formed using the thing of a block type or a graft mold as a polymer which forms a polymer part Since it has the dispersibility which the polymer part was more effectively compound-ized and was more excellent As compared with the conventional carbon black graft polymer, it can distribute good in various kinds of media. and compound-izing is easy also in the organic solvent which makes the polymerization prohibition effectiveness that the carbon black itself made greatly has a carbon content in a carbon black compound polymer ease and which can make electric insulation high -- etc. -- \*\* -- it may have the said description.

[0061] If a carbon black compound polymer is formed using the thing of a block type or a graft mold as a polymer which forms a polymer part [ although fields, such as improvement in dispersibility, relaxation of the polymerization prohibition effectiveness, and improvement in electric insulation, were improved, when such a carbon black compound polymer is blended into a photo-setting resin constituent and it considers as a black photo-setting resin constituent for example ] In order to be unable to participate in hardening reactions as a carbon black compound polymer of such structure, such as

photopolymerization thru/or optical bridge formation, at all substantially but to acquire sufficient photocuring property It will be necessary to blend a lot of photoresist compounds to the loadings of a carbon black compound polymer, an upper limit arises in the loadings of a carbon black compound polymer inevitably, and it becomes difficult to obtain sufficient protection-from-light nature by the thin coat. It is desirable when that a carbon black compound polymer has reactivity acquires a good hardening property, the distributed stability of carbon black, etc. to the medium by which similarly the medium which allots a carbon black compound polymer serves as a matrix also in a mode which serves as a hardened material by photopolymerization, thermal polymerization, heating crosslinking reaction, etc. [0062] Then, in the desirable operation gestalt of this invention, it shall have the functional group in which the polymer of the block type which forms the polymer part of said carbon black compound polymer, or a graft mold has reactivity to the matrix of the purpose media, such as a binder which blends this carbon black compound polymer, (II), for example, a partial saturation.double bond etc. When this functional group (II) reacts with the matrix of the purpose medium, carbon black and a polymer join together by the ionicity interaction after all and the matrix of this polymer and the purpose medium carries out covalent bond further, the small constituent of about [ that the high constituent of high resistance or a mechanical strength is obtained ], a resistance value change, or a change on the strength is obtained.

[0063] In addition, if functional groups (II), such as a partial saturation double bond, are introduced into the segment of the side which does not present association by the ionicity interaction on the front face of carbon black with but which carries out orientation to the method of outside, i.e., a segment, (B) [ when the obtained carbon black compound polymer is blended with a photo-setting resin constituent etc. ] Although it becomes what the hardening reaction of the constituent concerned advanced to fitness more, and could obtain sufficient protection-from-light nature by the thin coat, and was extremely excellent also in fields, such as a film strength and the distributed stability of carbon black Even if such a functional group (II) was introduced into the segment (A), when comparing with what does not have such a functional group (II), it was what can expect a quite good result. Of course, you may be what has such a functional group (II) to the both sides of a segment (A) and a segment (B).

[0064] It became clear that the carbon black compound polymer which has such a functional group (II) concerning this invention was what has effectiveness similar to a silane coupling agent etc. to some extent unlike a mere carbon black dispersing element.

[0065] Moreover, when a carbon black compound polymer is formed using the thing of a block type or a graft mold as a polymer which forms a polymer part The chain length of the segment (B) which carries out orientation outside is above long to some extent, for example, if the molecular weight of a segment (B) is or more 1000 extent Since the segment (B) of the carbon black compound polymer concerned exists with a wedge-like gestalt in the matrix of the purpose medium when the carbon black compound polymer concerned is blended into the purpose medium, the distributed condition stabilized more is demonstrated. For this reason, even if it does not have a functional group (II) which was described above by that constituent system, a reaction condition, etc. even if it was the case where the above-mentioned purpose medium was a photo-setting resin constituent etc., also in a film strength etc., it is equal in any way, and it became clear that the outstanding property could be demonstrated. Therefore, let the segment (B) of the polymer of a block type or a graft mold be chain length's comparatively long thing in this way in another desirable embodiment of this invention.

[0066]

[Embodiment of the Invention] Hereafter, this invention is explained more to a detail based on an embodiment.

[0067] Although it cannot be limited as carbon black used when manufacturing the carbon black compound polymer of this invention especially if it has functional groups, such as a carboxyl group and a hydroxy group, on the front face, for example, the thing of which classes, such as furnace black, channel black, acetylene black, and lamp black, can be used and the usual commercial item can be used as it is, what has a carboxyl group especially is desirable. Especially as carbon black, it is still more desirable to use the carbon black of pH 1-5 less than seven pH. Although the carbon black which has a

carboxyl group can come to hand easily as acid carbon black, what was obtained by oxidizing neutral or basic carbon black can use it suitably as a raw material in this invention. When carbon black does not have functional groups, such as a carboxyl group, or when it is seven or more pH, graft-ization may not be performed effectively. In addition, the method of examining pH of carbon black is JISK. It is based on 6211.

[0068] Moreover, as for especially the mean particle diameter of carbon black, it is desirable that it is within the limits of 0.001-0.2 micrometers 0.0005-0.5 micrometers. Since mean particle diameter is not obtained easily, less than 0.0005-micrometer carbon black has a small industry top meaning. Moreover, when mean particle diameter exceeds 0.5 micrometers, sufficient dispersibility for the obtained carbon black compound polymer may be unable to be given.

[0069] The polymer which is compound-ized by such carbon black by ionic bond on the other hand, and forms a polymer part is the thing of the block which consists of a segment (A) which has the amino group, an amide group, and/or a nitrile group, and a segment (B) which has compatibility to a medium, or a graft mold.

[0070] Furthermore, in the desirable embodiment of this invention, said segment (A) and/or (B) are the polymer which has the radical (II) which has the matrix of the purpose medium which blends this carbon black compound polymer, and reactivity. In addition, although existing in a segment (B) is more desirable as for the radical (II) which has the matrix of the purpose medium, and reactivity, it may exist in a segment (A) and may exist in both sides. The reason by which the segment (B) has a medium and compatibility when this has the radical (II) which has the matrix of the purpose medium and reactivity in ZEGUMENTO (A) and there is in a segment (B), and the carbon black compound polymer dispersibility acquired are because it is not inferior at all and a radical (II) and the matrix of the purpose medium can react with next curing temperature. [ no ]

[0071] In the final gestalt of the carbon black compound polymer which starts this invention here The block of request structure which was described above, or the polymer of a graft mold (in addition, the amino group, amide group, and/or nitrile group of a segment (A) are in the condition of having carried out ionic bond to the functional group on the front face of carbon black.) In the production process which carries out mixed distribution of the polymer part to carbon black, it is not necessary to be the polymer of request structure which was not necessarily described above that what is necessary is just to become.

[0072] Namely, when [ for example, ] it is going to obtain the carbon black compound polymer which made the polymer of the block which has the radical (II) which has the matrix of the purpose medium which is the desirable embodiment of the above 1st, and reactivity, or a graft mold compound-ize, The segment which has (1) amino group, an amide group, and/or a nitrile group so that it may mention later (A), It is the block or graft mold which becomes a medium from the segment (B) which has compatibility. And the polymer which has the matrix of the purpose medium and the radical (II) which can react in a segment (A) and/or a segment (B) is formed first. The segment which has not only the approach of making carbon black carrying out mixed distribution of this but (2) amino groups, an amide group, and/or a nitrile group (A), The block which becomes a medium from the segment (B) which has compatibility, or the precursor polymer of a graft mold, An approach which introduces into this precursor polymer the radical (II) which has the matrix of the purpose medium, and reactivity after carrying out mixed distribution of the carbon black beforehand, (3) by changing the radical (II) which has the matrix of the purpose medium, and reactivity into parenchyma top carbon black and the radical which does not have reactivity (protective group) It introduces into the block which consists of a segment (A) and a segment (B), or the graft mold polymer. The carbon black compound polymer concerning this invention can be manufactured also by approach to which the radical (II) which has the matrix of the purpose medium which removes a protective group and asks for this polymer and carbon black after mixed distribution, and reactivity is exposed.

[0073] As a block or a graft mold polymer It is not restricted to the thing of simple structures, such as an A-B mold block copolymer shown in drawing 2 (a), and an A-B mold graft copolymer shown in drawing 2 (b). The B-A-B mold block copolymer shown in drawing 2 (c), or a more advanced mutual

block copolymer, Various kinds of things, such as the Kushigata graft copolymer in which two or more B segments shown in drawing 2 (d) come to carry out a graft to A segment, and a graft copolymer of the shape of a star type further shown in drawing 2 (e), are contained. In addition, the inside Y of drawing expresses the matrix of the purpose medium, and the reactant radical (II) which can react. Although these the blocks of various kinds of or the polymer of a graft mold expresses the condition of having joined together by the ionicity interaction to the carbon black particle (CB) front face, drawing 2 (f) In short, it is in the condition combined with the carbon black particle front face by the ionicity interaction. If the orientation of at least one segment (B) can be carried out with a certain amount of degree of freedom toward an outside [ front face / carbon black particle ] A block or a graft mold polymer may be what has what kind of gestalt. Further for example Even if it has two or more sorts of segments as what is classified into a segment (A) (the same is said of a segment (B)) Have different properties from a segment (A) and a segment (B), for example, these in-between properties. Or the segment of \*\*\*\*\* which attaches the function of making it fall etc. or it raises "fluctuation" (maneuverability) in the medium of the graft chain which extends a graft chain (it is hereafter called the (C) segment.) You may be the thing of a form which was allotted in the middle of these segments (A) and a segment (B) etc. Although it has even if the (C) segment does not have an amino group, it is considered to be a desirable thing from when raising graft efficiency here not to have an amino group generally. It is also possible to introduce the reaction radical which can furthermore construct a bridge over this (C) segment mutually depending on the case. In addition, although the (C) segment was called from an explanation, it will be classified into a segment (A) which was described above, or a segment (B) if this (C) segment is also roughly divided.

[0074] In addition, in drawing 2, although the mode to which the reactant radical (II) expressed with Sign Y exists in a segment (B) is shown, as described above, a reactant radical (II) may exist in a segment (A), or may exist in both sides.

[0075] In the 1st desirable embodiment of this invention, as a radical (II) which has the matrix of the purpose medium introduced into a block or a graft mold polymer, and reactivity, it can choose suitably according to the class of purpose medium, for example, a partial saturation double bond radical, a carboxyl group, an alkoxy silyl radical, an epoxy group, a thioepoxy radical, an aziridine radical, an N-hydroxy acrylamide radical, an oxazoline radical, an isocyanate radical, a silanol group, and a thiol group are mentioned. That is, when the purpose medium makes the hardenability resin of a radical polymerization mold a matrix, a partial saturation double bond radical is mentioned as a radical (II). Specifically, the case where heat curing of the case where the carbon black compound polymer which has a partial saturation double bond radical is added, or the unsaturated polyester is carried out is mentioned to a photo-setting resin constituent etc. Moreover, a carboxyl group etc. is mentioned by the hardenability resin of an unsaturated polyester system. If a matrix is a silicon system by the sol-gel method, an alkoxy silyl radical will be mentioned.

[0076] In this invention, a partial saturation double bond radical points out a vinyl group, an acryloyl radical, a meta-acryloyl radical, etc. with moreover, an alkoxy silyl radical - Si (OR1) (R1 is at least one sort of radicals which are chosen from the group which consists of a hydrogen atom, an alkyl group, or an acyl group and which may be permuted, and when two or more R1 is in 1 molecule, even if two or more R1 [ these ] is mutually the same, it may differ.) The radical expressed is shown.

[0077] A certain functional group may not react with a binder component in a certain hardenability constituent, and a carbon black compound polymer exists as a mere dispersing element in that case. For example, although a hydroxyl group is a nonresponsive functional group in a photoresist constituent, it can play a role of a radical (II) by performing a matrix and covalent bond with a melamine cross-linking agent into a phenol system resin hardenability constituent. Therefore, what is necessary is just to choose a radical (II) suitably as a binder system and a thing which can react.

[0078] The matrix of the binder as used in [ here ] this application specification thru/or the purpose medium is explained. Although there is an example to which make the polymers which gave the functional group to one of the technique used for reactive processing etc. come to react in recent years, when based on the same view, the polymer which has said radical (II) and reactivity is the matrix of the

binder as used in this application specification thru/or the purpose medium. For example, if the example of an acrylic photoresist constituent is taken, it will be divided into the binder of this constituent at a part for the part non-constructing a bridge and a hard spot, but a system can serve as a hardenability constituent clearly because polyfunctional acrylate is accompanied by the polymerization reaction by the photoinitiator or direct light. Under the present circumstances, it is considered that reacting with polyfunctional acrylate reacts with the matrix of a binder thru/or the purpose medium. moreover -- for example, chain elongation agent addition (elastomer intermediate product) of two organic functions for the improvement in b molecular weight if the example about an elastomer hardened material is described, after in the case of a polyurethane system elastomer making a 2 organic-functions polyol and isocyanate react and considering as a prepolymer and c -- bridge formation is completed using the compound of three more or more organic functions many organic functions etc. If it has the multifunctional compound of three or more organic functions of c phase, and the radical (II) which can react also in this case, it can be said that it reacted with the matrix of a polyurethane binder thru/or the purpose medium. Like these examples, since the cross linking agent of many organic functions and a vulcanizing agent can also serve as a matrix of a binder component thru/or the purpose medium, in this application specification, a cross linking agent, a vulcanizing agent, etc. are regarded as a binder component thru/or a matrix.

[0079] in addition, the introductory approach into the polymer of these reactant radicals (II) -- therefore, it mentions later.

[0080] In the 1st mode of this invention, it is necessary to make the segment (A) which has the amino group, an amide group, and/or a nitrile group into what has low compatibility to the purpose medium on the segment chain structure. In addition, since low compatibility here is a relative thing depended on contrast with the segment (B) of another side to the last, by the class of purpose medium, or the configuration situation of a segment (B), a segment (A) can be considered as various kinds of configurations, and cannot generally be \*\*\*\*\* (ed). However, considering still more nearly another viewpoint, since it becomes what shows a better stacking tendency to carbon black to consider as what has high compatibility to carbon black, said segment (A) is desirable. that to which, as for said segment (A), that principal chain is mainly concerned with carbon-carbon bonding from this point -- more preferably Rings, such as the benzene ring, a naphthalene ring, and an indene ring, shall be included in a principal chain, and it shall have in intramolecular a reactant radical which was described above. On the other hand, for example, said segment (B) It is more desirable than a segment (A) to include many association of those other than carbon-carbon bondings, such as ether linkage, skeletal structure especially with few rings, for example, polysiloxane structure, with little carbon-carbon bonding or, and an ester bond.

[0081] however, a line moderate since the stiffness of a segment (A) will increase extremely and there is fear with difficult contiguity of the segment (A) on the front face of carbon black at the time of the graft to carbon black, when a segment (A) consists of only advanced condensed multi-ring structures substantially -- it is desirable to have structure.

[0082] As described above, the chain structure of a segment (A) It responds to the chain structure of the segment (B) chosen from the field of the dispersibility which it is going to give to carbon black. Although it can choose suitably and can consider as polymerization (it has above-mentioned reactant radical) chains, such as independent or the various vinyl system polymers by copolymerization, such as a styrene monomer, an acrylic (meta) monomer, and an alkylene system monomer, polyester, and a polyether among these, a vinyl system polymer and the vinyl system monomer component which has a ring especially -- more than 50 mol % -- more preferably more than 60 mol % -- since the combination with various kinds of segments (B) chosen according to the purpose medium of being the vinyl system polymer which contains and has a reactivity nature machine becomes possible, it is desirable.

[0083] mainly concerned with a styrene monomer and (meta) an acrylic monomer, especially if economical efficiency etc. is furthermore taken into consideration -- independent -- it is -- carrying out -- a copolymerization polymer, especially a styrene monomer component -- more than 50 mol % -- further -- more than 60 mol % -- the polymerization chain included (it has the above-mentioned reactant radical)



is desirable.

[0084] In this 1st mode, however, the segment (A) which has the amino group, an amide group, and/or a nitrile group If it considers as the sufficiently low thing of compatibility from a segment (B) to the purpose medium on the segment chain structure A segment (A) does not necessarily have to consider as what has high compatibility to carbon black. Even if there is no substantial difference in the compatibility of a segment (A) and a segment (B) to carbon black Or even if compatibility is lower than a segment (B), it is fully usable, and it is also possible to make a segment (B) side for example, into styrene system structure depending on the case.

[0085] On the other hand, a suitable thing is chosen from the polymerization chain to which a segment (B) has polyether system structures, such as for example, polysiloxane system structure, the Pori (meta) acrylic structure, and a polyalkylene glycol, polyester system structure, polyalkylene system structure, polyamide structure, polyimide structure, polyurethane structure, fluororesin system structure, etc. with the properties of giving carbon black, such as dispersibility to the purpose medium. For example, a polysiloxane system structure chain is the purpose which gives being [ which improves the dispersibility to the inside of a polar low medium ] the purpose, that water repellence, a mold-release characteristic, thermal resistance, weatherability, flexibility, low viscosity, etc. are further excellent, and that there is no cold brittleness. Moreover (meta), an acrylic chain is for the purpose (for example, acrylic-acid (meta) hydroxyalkyl ester etc. is introduced and a hydrophilic property is raised.) which introduces various acrylic (meta) ester monomer components, and gives broad hydrophilic-hydrophobicity. Moreover, a polyalkylene glycol chain is the purpose which gives a hydrophilic property, lubricity, flexibility, and the property of \*\*\*\*\*, and can be adopted, respectively.

[0086] a core [ mode / which has a partial saturation double bond radical as a radical (II) which a segment (A) has the amino group, an amide group, and/or a nitrile group hereafter although an understanding of this invention is made easy, and has the matrix of the purpose medium, and reactivity in a segment (B) ] -- carrying out -- \*\*\*\*\* -- it \*\*\*\*\* just.

[0087] In addition, although the mode which combines with carbon black the block of the approach of the above (1), i.e., the request structure which introduced the partial saturation double bond as a radical (II) into the segment (B), or the polymer of a graft mold by the ionicity interaction in the following explanation is described as a core The other point about that of only the introductory process of compound-izing and a partial saturation double bond getting mixed up It will be understood that the case of the approach of the above (1) and in the case of the approach of (2) it is only needing a deprotection radical reaction process after it being mostly common and graft-izing, and is that mostly common the case of the approach of the above (1) and in the case of the approach of (3).

[0088] In the embodiment concerned, the segment (B) of the polymer of a block or a graft mold needs to have a partial saturation double bond in the part. Although it is also possible to consider as the gestalt made to exist in the principal chain of a segment (B), if it carries out from a viewpoint of the ease of composition of the polymer of the block concerning this invention, or a graft mold, as for this partial saturation double bond, it is desirable to consider as the gestalt made to exist in the side chain combined with the principal chain of a segment (B).

[0089] Especially as an approach of obtaining the polymer of the block which has the segment (A) which has such an amino group, an amide group, and/or a nitrile group, and the segment (B) which has a partial saturation double bond as a reactant radical (II), or a graft mold, it is not limited but can manufacture by combining suitably well-known various blocks or the well-known polymerization technique of a graft mold polymer, and the manufacturing technology of a reactant polymer.

[0090] As an approach of obtaining the polymer of a graft mold, the approach of carrying out an approach which carries out a polymerization is learned [ polymer / solution polymerization, the emulsion polymerization, the bulk polymerization, or / that carries out a suspension polymerization and serves as a principal chain ] in the polymerization initiator and the polymerization nature monomer, for example under existence of the high molecular weight object used as a graft chain. However, a lot of polymers which are not graft-ized are contained in the graft copolymer obtained as it is that in which said high molecular-weight object does not have a radical polymerization nature functional group, and it



has the fault that graft efficiency is low. So, it is desirable to carry out using a radical polymerization nature quantity molecular-weight object as the high molecular-weight object concerned. Generally such a radical polymerization nature quantity molecular weight object is called a "macro monomer." It is the high molecular weight object which has a radical polymerization nature machine, for example, a bitter taste (meta) roil radical, a styryl radical, etc. at the piece end. For example, it is what is obtained by making the polymer which has a piece end carboxyl group in an organic solvent, and the radical polymerization nature monomer which has a glycidyl group react. (For example, to JP,43-11224,B) the method of making the prepolymer and glycidyl methacrylate which are made to carry out the radical polymerization of the radical polymerization nature monomer under existence of mercaptoacetic acid, and are obtained in an organic solvent react under existence of a dimethyl lauryl amine catalyst, and obtaining them is indicated. .

[0091] In addition, such a radical polymerization nature quantity molecular weight object as a component which forms the principal chain of a segment (B) is later mentioned about this point, although a molecular design needs to be carried out so that it may have the active spot (functional group) for introducing the side chain thru/or the extended chain which has a partial saturation double bond behind.

[0092] In order to obtain the graft copolymer which follows, for example, is applied to this invention Under the radical polymerization nature quantity molecular weight (object b) existence which was described above as a component which forms the principal chain of a segment (B) first The polymerization nature monomer which has in intramolecular the polymerization nature monomer (a1) and/or amide group which have in intramolecular an amino group which was described above (a2) (hereafter, a polymerization nature monomer (a1) and a polymerization nature monomer (a2) may be named generically, and it may be described as a polymerization nature monomer (a)) And the polymerization of the polymerization nature monomer (c) which forms the frame of the segment (A) blended by the need in addition to this is carried out. The graft mold polymer as a precursor which consists of main frame parts of a segment (A) and a segment (B) which have the amino group, an amide group, and/or a nitrile group is obtained. Then, what is necessary is to make the compound (d) which has in intramolecular a reactant radical to the active spot further established in the main frame part of a segment (B), and a partial saturation double bond react with the precursor concerned, and just to introduce a partial saturation double bond into a segment (B).

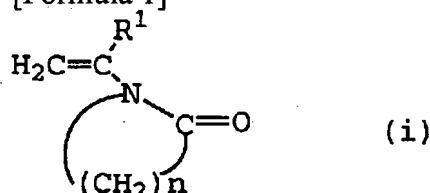
[0093] In addition, as illustrated here, when a segment (B) is what has the radical (II) which has the matrix of the purpose media, such as a partial saturation double bond, and reactivity as a polymer part of the carbon black compound polymer concerning this invention, it is thought also from the following points that it is advantageous. namely, in the carbon black graft polymer of a conventional type When a macro monomer is used as a component which constitutes a segment (B), When the purity of a macro monomer is low, namely, when the percentage is not 100% although it has a radical polymerization nature machine at the piece end, Also after compounding a graft polymer and making carbon black graft-ize In the carbon black compound polymer compounded correctly, the defect object of said macro monomer is intermingled as a mere segment (polymer). Consequently, when the obtained product is blended with the purpose media, such as a binder, it is assumed that contribution of what does not have the mere segment concerned, either and it remains in the last binder. However, since such an intermingled mere segment also reacts with the matrix of the purpose medium and is incorporated into the last binder when it has the radical (II) which has the matrix of the purpose medium, and reactivity in a segment (B), a hardening property is not reduced.

[0094] As a polymerization nature monomer (a1) which has an amino group in intramolecular For example, N and N-dimethylaminoethyl (meta) acrylate, N, and N-diethylaminoethyl (meta) acrylate, N and N-dimethylaminopropyl (meta) acrylate, N, and N-diethylamino propyl (meta) acrylate, N and N-dimethylamino butyl (meta) acrylate, N, and N-diethylamino butyl (meta) acrylate, Amino alkyl (meta) acrylate, such as N and N-dimethylamino hexyl (meta) acrylate, N, and N-diethylamino hexyl (meta) acrylate N and N-dimethylaminoethyl (meta) acrylamide, N, and N-diethylaminoethyl (meta) acrylamide, N and N-dimethylaminopropyl (meta) acrylamide, N, and N-diethylamino propyl (meta)

acrylamide, N and N-dimethylamino butyl (meta) acrylamide, N, and N-diethylamino butyl (meta) acrylamide, Amino alkyl (meta) acrylamides, such as N and N-dimethylamino hexyl (meta) acrylamide, N, and N-diethylamino hexyl (meta) acrylamide N and N-dimethylaminoethyl vinyl ether, N, and N-diethylamino ethyl vinyl ether, N and N-dipropylamino ethyl-vinyl-ether, N, and N-dibutylamino ethyl vinyl ether, N and N-dimethylaminopropyl vinyl ether, N, and N-diethylamino propyl vinyl ether, N and N-dipropyl aminopropyl vinyl ether, N, and N-dimethylamino butyl vinyl ether, N and N-diethylamino butyl vinyl ether, N, and N-dipropylamino butyl vinyl ether, N and N-dibutylamino butyl vinyl ether, N, and N-dimethylamino pentyl vinyl ether, N and N-diethylamino pentyl vinyl ether, N, and N-dipropylamino pentyl vinyl ether, N and N-dimethylamino hexyl vinyl ether, N, and N-diethylamino hexyl vinyl ether, N and N-dipropylamino hexyl vinyl ether, N, and N-dibutylamino hexyl vinyl ether, Amino alkyl vinyl ether, such as N and N-dimethylamino octyl vinyl ether, N, and N-diethylamino octyl vinyl ether Vinylpyridines, such as 2-vinylpyridine, 4-vinylpyridine, and 5-ethyl-2-vinylpyridine Although vinyl piperidines, such as vinyl quinolines, such as vinyl imidazole derivatives, such as 1-vinyl imidazole and 1-vinyl-2-methylimidazole, and 2-vinyl quinoline, and an N-methyl-3-vinyl piperidine, can be illustrated Of course, it is not limited to these. Amino alkyl (meta) acrylate and the alkyl (meta) acrylate which have the 3rd [ further ] class amino group are [ among these ] especially desirable.

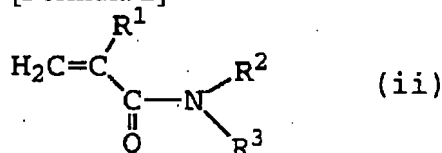
[0095] It is the monomer expressed with the following general formula (i) represented by vinyl pyrrolidone as a polymerization nature monomer (a2) which has an amide group, and [0096].

[Formula 1]



[0097] (-- among a formula, R1 is a hydrogen atom or a methyl group, and is n=2-4.) -- the monomer expressed with the following general formula (ii) represented by acrylamide, methacrylamide, N,N-dimethylacrylamide, etc., and [0098]

[Formula 2]



[0099] (-- among a formula, R1 is a hydrogen atom or a methyl group, and it is a hydrogen atom or the alkyl group of C1-C12, and R2 and R3 may be the same, or they may differ.) -- or natural, although N-methylol acrylamide, N-butoxy methylacrylamide, diacetone acrylamide, etc. can be illustrated -- it is not limited to these. Especially vinyl pyrrolidone is [ among these ] desirable.

[0100] As a polymerization nature monomer (a3) which has a nitrile group, although acrylonitrile, a methacrylonitrile, etc. can be illustrated, of course, it is not limited to these, for example. Among these, especially acrylonitrile is desirable.

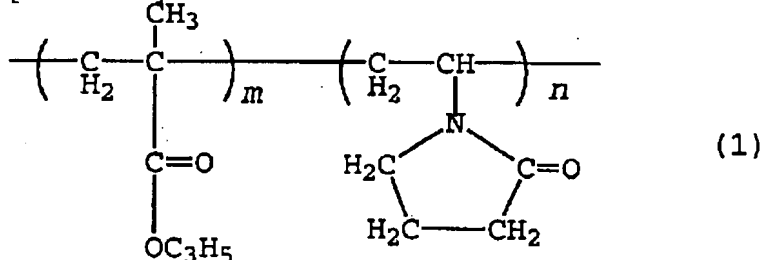
[0101] moreover, in order to make with the frame of a request which described the segment (A) above, as a polymerization nature monomer (c) which can be used as occasion demands It will not be limited especially if radical polymerization nature quantity molecular weight object (b) copolymerization which was described above as said monomer (a) and a component which is mentioned later, and which forms a segment (B) as like can be carried out. The molecular structure of the segment (A) which it is going to obtain is embraced. For example, styrene, o-methyl styrene, m-methyl styrene, p-methyl styrene, alpha methyl styrene, p-methoxy styrene, p-tert-butyl styrene, p-phenyl styrene, Styrene system monomers, such as o-KURORU styrene, m-KURORU styrene, and p-KURORU styrene; An acrylic acid, A methyl

acrylate, an ethyl acrylate, acrylic-acid propyl, acrylic-acid n-butyl, Isobutyl acrylate, acrylic-acid dodecyl, acrylic-acid stearyl, 2-ethylhexyl acrylate, a methacrylic acid, a methyl methacrylate, Ethyl methacrylate, methacrylic-acid propyl, n-butyl methacrylate, Methacrylic-acid isobutyl, n-octyl methacrylate, methacrylic-acid dodecyl, monomers, such as acrylic acids, such as 2-ethylhexyl methacrylate and stearyl methacrylate, or methacrylic-acid system monomer; ethylene, a propylene, a butylene, a vinyl chloride, and vinyl acetate, -- one sort -- or two or more sorts can be used suitably. [0102] in addition, the case where a segment (A) shall have an amino group -- the above-mentioned polymerization nature monomer (a1) -- more than 0.5 mol % -- when containing performs good compound-ization with carbon black -- desirable -- especially -- 1 - 50-mol % -- further -- as a polymerization nature monomer (a1) -- amino alkyl (meta) acrylate -- more than 0.5 mol % -- more -- desirable -- 1 - 50-mol % -- containing is desirable.

[0103] moreover, the case where a segment (A) shall have an amide group -- also setting -- the above-mentioned polymerization nature monomer (a2) -- more than 0.5 mol % -- especially -- 1 - 50-mol % -- it is desirable when containing performs good compound-ization with carbon black. Here, as an example of concrete structure of the segment (A) which has an amide group, there is a thing as shown below, for example.

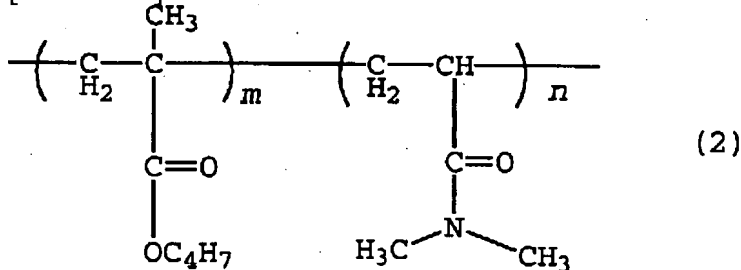
[0104]

[Formula 3]



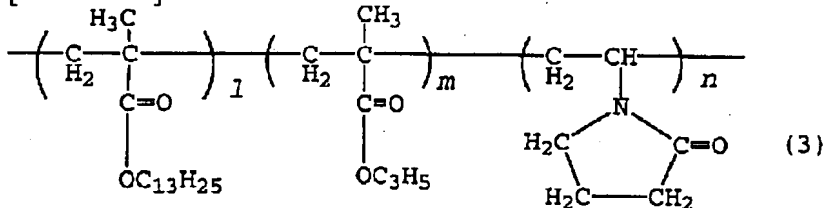
[0105]

[Formula 4]



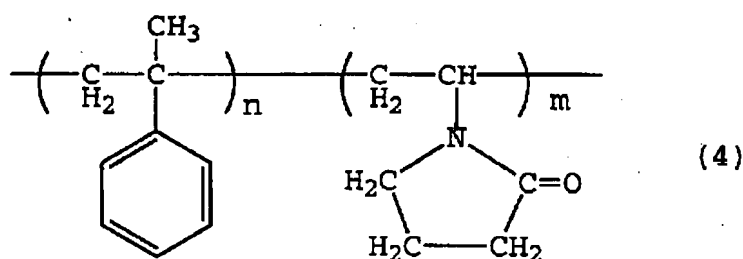
[0106]

[Formula 5]



[0107]

[Formula 6]



[0108] Of course, not the thing limited to these things in any way but the radical (II) which has the matrix of the purpose media, such as a COOH radical and a double joint radical, and reactivity could be introduced into the segment (A) again. In addition, especially the thing of (4) is desirable among the examples of structure illustrated above.

[0109] moreover -- moreover, the case where a segment (A) shall have a nitrile group -- also setting -- the above-mentioned polymerization nature monomer (a3) -- more than 0.5 mol % -- especially -- 1 - 50-mol % -- it is desirable when containing perform's good compound-ization with carbon black.

[0110] Furthermore, what [ not only ] has any one of the amino group, an amide group, or the nitrile groups as a segment (A) as described above but it is any two among these. of course, it is also possible to have the thing which it has thru/or all three.

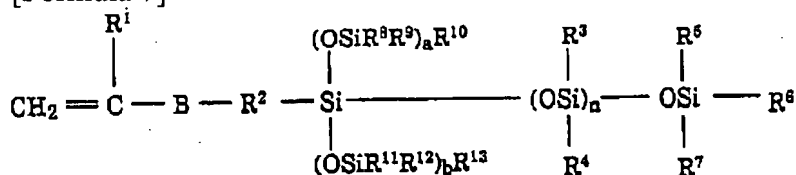
[0111] What is necessary is on the other hand, just to have a reactant radical as a radical polymerization nature quantity molecular weight object (b) at the piece end of polymerization chains, such as polyether system structures, such as a desired polymerization chain, for example, polysiloxane system structure, the Pori (meta) acrylic structure, and a polyalkylene glycol, polyester system structure, polyalkylene system structure, polyamide structure, polyimide structure, polyurethane structure, and fluororesin system structure, since the principal chain of a segment (B) component is constituted.

[0112] For example, when it shall have polysiloxane system structure for a segment (B), as the polysiloxane system structure concerned, the thing containing polyorganosiloxanes, such as a poly dimethylsiloxane radical, a poly dimethylsiloxane radical of a partial alkyl group permutation, a poly dimethylsiloxane radical of a partial aryl group permutation, and a tris (trialkyl siloxy) silyl propyl group, etc. can be illustrated.

[0113] therefore, as a radical polymerization nature quantity molecular weight object (b1) which has polysiloxane system structure for example, (meta), acryloyl radical content poly dimethylsiloxane and styryl -- radical content poly dimethylsiloxane (meta) acryloyl radical content partial octyl permutation poly dimethylsiloxane -- Styryl radical content partial octyl permutation poly dimethyl SHIROKISAN, styryl radical content partial phenyl permutation poly dimethylsiloxane, Polymerization nature polysiloxanes, such as tris (trimethylsiloxy) silyl propyl (meta) acrylate, are mentioned, one sort or two sorts or more can be used out of these, and especially the following are desirable.

[0114]

[Formula 7]



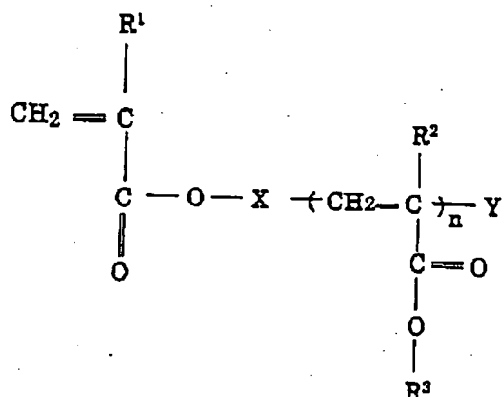
[0115] (B shows -COO- or a phenylene group among a formula, and, as for R3-R13, R2 is [ R1 / methyl group / a hydrogen atom or ] however, the same in the alkylene group of carbon numbers 1-6 -- or it differs, an aryl group, the alkyl group of carbon numbers 1-6, or the alkoxyl group of carbon numbers 1-10 is shown, respectively, and a and b are the same -- or it differs and n shows the integer of 0-200 for the integer of 0-10, respectively.)

Similarly, in a segment (B), when it shall have the poly meta (acrylic) system structure, as a radical

polymerization nature quantity molecular weight object (b2), a thing as shown below may be used, for example.

[0116]

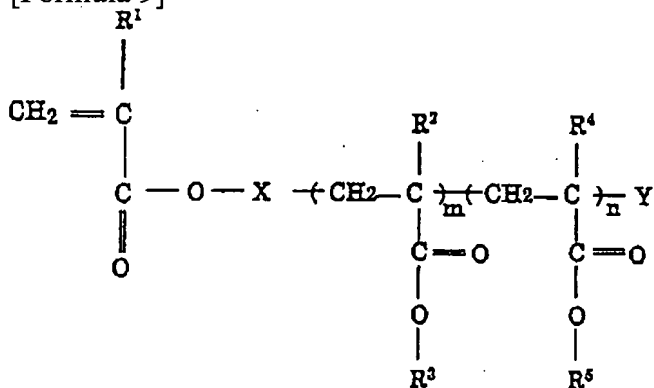
[Formula 8]



[0117] (however, the inside of a formula, and R1 and R2 are the same -- or it differs, a hydrogen atom or a methyl group is shown, R3 shows the alkyl group of carbon numbers 1-25, X is the joining chain of arbitration, Y shows an initiator end or H atom, and n shows the integer of 0-500.)

[0118]

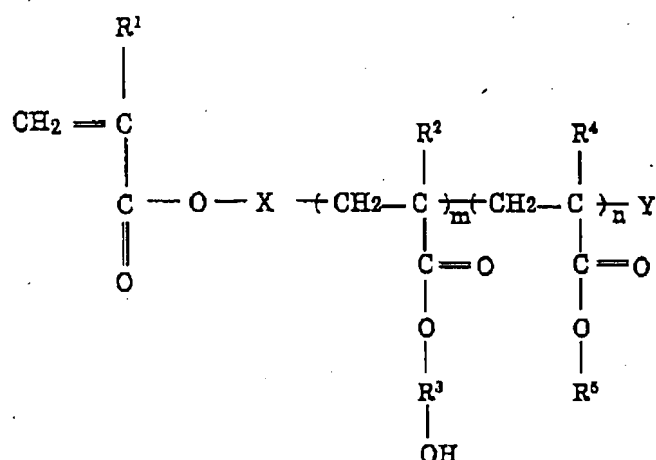
[Formula 9]



[0119] (however, the inside of a formula, and R1, R2 and R4 are the same -- or it differs, a hydrogen atom or a methyl group is shown, and R3 and R5 are the same -- or it differs, the alkyl group of carbon numbers 1-25 is shown, X is the joining chain of arbitration, Y is an initiator end or H atom, and m and n are the same respectively -- or it differs and the integer of 0-500 is shown.)

[0120]

[Formula 10]

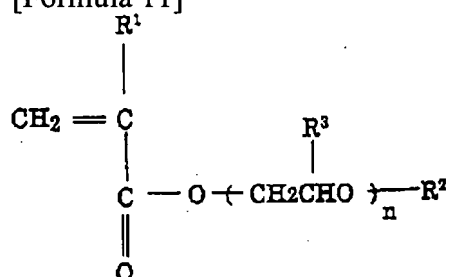


[0121] (however, the inside of a formula, and R1 and R2 are the same -- or it differs, a hydrogen atom or a methyl group is shown, R3 shows the alkylene group of carbon numbers 1-25, R4 shows the alkyl group of carbon numbers 1-25, X is the joining chain of arbitration, Y is an initiator end or H atom, and n and m are the same -- or it differs and the integer of 0-500 is shown.)

Moreover, in a segment (B), when it shall have polyalkylene glycol system structure, as a radical polymerization nature quantity molecular weight object (b3), a thing as shown below may be used, for example.

[0122]

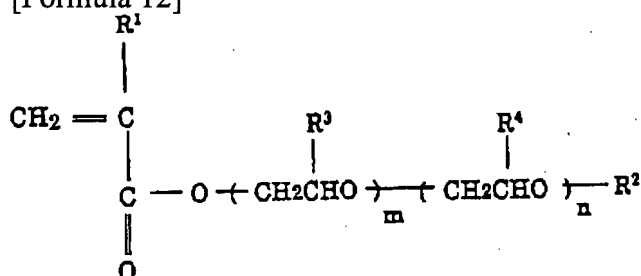
[Formula 11]



[0123] (however, the inside of a formula, and R1, R2 and R3 are the same -- or it differs, a hydrogen atom or a methyl group is shown, and n shows the integer of 0-500.)

[0124]

[Formula 12]

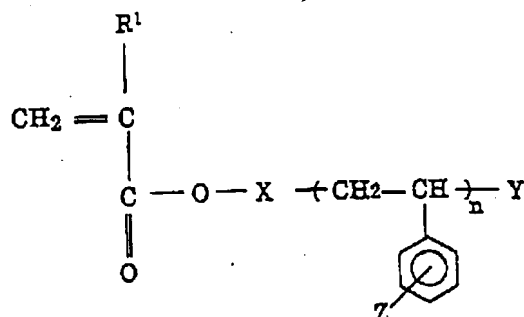


[0125] (however, the inside of a formula, and R1, R2, R3 and R4 are the same -- or it differs, a hydrogen atom or a methyl group is shown, and n and m are the same -- or it differs and the integer of 0-500 is shown.)

Furthermore, in a segment (B), when it shall have polystyrene system structure, as a radical polymerization nature quantity molecular weight object (b4), a thing as shown below may be used, for example.

[0126]

[Formula 13]

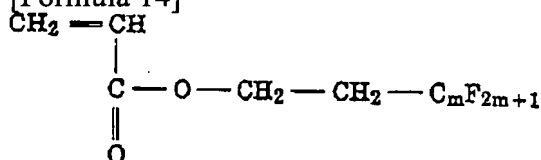


[0127] (However, R<sup>1</sup> shows a hydrogen atom or a methyl group among a formula, X is the joining chain of arbitration, in Y, an initiator end or H atom, and Z show a hydrogen atom, a halogenation radical, or the alkyl group of carbon numbers 1-8, and n shows the integer of 0-500.)

In addition, about the joining chain X shown in the above-mentioned formula group, for example, it is shown in "the chemistry and industry" (the Yamashita \*\*\*\* editorial supervision, IPC Issue, common Narimoto year 9 month 20 day) of a macro monomer in detail, and although shown in this, any can also be used.

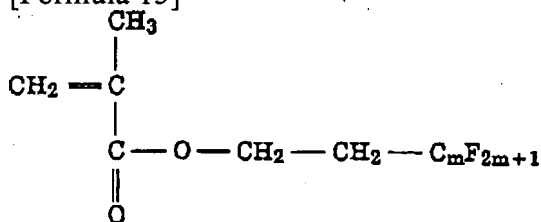
[0128] Moreover, it is [0129] when considering as fluororesin structure.

[Formula 14]



[0130]

[Formula 15]



[0131] (However, the integer of 1-25 is shown by the inside m of a formula.) etc. -- a polymerization may be carried out in the form which used the fluorine system (meta) acrylic monomer itself as the segment (B), and what was further formed into the macro monomer using the end halt or the chain transfer method of a radical polymerization by the living polymerization method of fluorine system (meta) acrylate can be used as a segment (B).

[0132] A well-known polymerization method can be used as a polymerization method at the time of obtaining the precursor polymer of a graft mold which was described above. For example, a bulk-polymerization method, a suspension-polymerization method, an emulsion-polymerization method, a solution polymerization method, etc. can be mentioned. Especially, the solution polymerization method for using a radical catalyst is desirable.

[0133] As a radical catalyst, if used for the polymerization of a vinyl monomer, all can usually be used. as a typical thing, peroxide system compounds, such as azo compound; benzoRIRUPA oxide, such as 2, 2'-azobisisobutyronitril, 2, and 2'-azobis (2,4-dimethylvaleronitrile), G tert-butyl peroxide, tert-butyl peroctoate, and tert-butyl peroxi-2-ethylhexanoate, etc. mention -- having -- these -- usually -- per [ 0.2 ] monomer 100 weight section - 10 weight sections -- it is preferably used within the limits of 0.5 - 5 weight section. Moreover, as a solvent, it is suitably chosen according to the class of the monomer and

radical polymerization nature quantity molecular weight object which are used.

[0134] Thus, after obtaining the precursor polymer of the graft mold which consists of main frame parts of a segment (A) and a segment (B) which have the amino group, an amide group, and/or a nitrile group, how to introduce into a segment (B) the side chain thru/or the extended chain which has a partial saturation double bond is explained.

[0135] Especially as the active spot (functional group (III)) established in the main frame part of the segment (B) in said precursor polymer in here, it is not limited and various kinds of things can be used. Although the amino group, an imino group, a thiol group, a silanol group, an isocyanate radical, etc. can more specifically be mentioned as a functional group (III) which a segment (B) has that what is necessary is just things other than a carboxyl group, it is a hydroxyl group alcoholic [ especially desirable ] thru/or phenolic. In addition, although there are some structure expressions which were illustrated as a desirable thing and which do not show such a functionality radical (III) concretely in explanation of said radical polymerization nature quantity molecular weight object, if what has these functional groups is used for a part of monomer used for carrying out the polymerization of these radical polymerization nature quantity molecular weight objects, for example, becoming the thing of request structure easily will be understood.

[0136] As a compound (d) which has in intramolecular a reactant radical (IV) to the functional group (III) which such a segment (B) has on the other hand, and a partial saturation double bond (reactant radical (II)) Although not limited especially, it has a partial saturation double bond (reactant radical (II)) at the piece end. The compound (hetero functional compound) with which the reactivity of both ends which has the reactant radical (IV) which has the active spot (functional group (III)) and reactivity in a segment (B) at the end of another side differs is desirable. in addition, said polymerization nature monomer (a) carried out -- the same -- a hetero -- although it is a functional compound, as this compound (d), it shall have the reactant radical of another kind with said polymerization nature monomer (a) at least

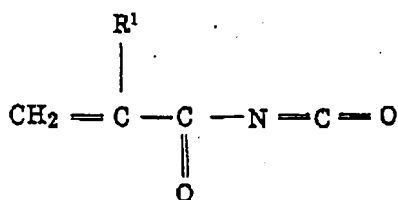
[0137] Although it is not limited as long as it has the active spot (functional group (III)) and reactivity in a segment (B) as a reactant radical (IV) which this compound (d) has especially, it is desirable that it is an isocyanate radical. If the compound which has an isocyanate radical as a reactant radical is used, as a functional group (III) of the above mentioned segment (B) By being able to use an alcoholic thru/or phenolic hydroxyl group, the amino group, an imino group, a thiol group, a silanol group, etc., and choosing suitable conditions The functional group (III) in this segment (B), and the epoxy group introduced into the segment (A), A reaction with reactant radicals (I), such as a thioepoxy radical, an aziridine radical, and an oxazoline radical, And, without producing and carrying out the reaction of the isocyanate radical concerned and the reactant radical (I) introduced into the segment (A) It is because the partial saturation double bond which an isocyanate radical is made to react to the functional group (III) of a segment (B) easily, is made to combine, and a compound (d) has in a segment (B) can be introduced. Since a good nucleophilic reaction occurs that especially the functional group (III) of a segment (B) is an alcoholic thru/or phenolic hydroxyl group between this isocyanate radical and a urethane bond can be formed, it is desirable.

[0138] As an especially desirable isocyanate radical content unsaturated compound (d1), as a compound (d) which has an isocyanate radical at the piece end as a reaction radical, and has a partial saturation double bond at the end of another side Acryloyl isocyanate, isocyanate alkyl (meta) acrylate, (Meta) The partial reactant of hydroxyl-group content (meta) acrylate, such as hydroxyalkyl (meta) acrylate, and the poly isocyanate compound, (Meta) Although a thing called the isocyanate radical end urethane prepolymer which the polyol which has acrylic residue, and the poly isocyanate compound are made to react, and is obtained can be illustrated Among these, acryloyl isocyanate, isocyanate alkyl (meta) acrylate, etc. which have a structure expression as shown especially below (meta) are desirable.

[0139]

[Formula 16]

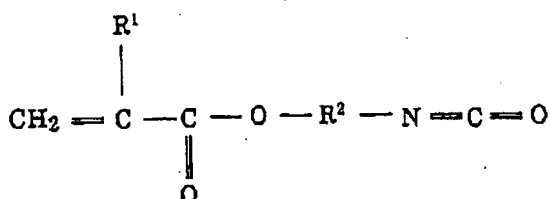




[0140] (However, the inside R1 of a formula is a hydrogen atom or a methyl group.)

[0141]

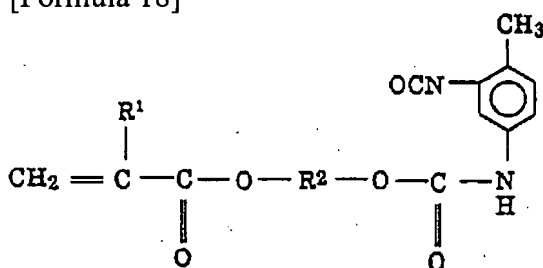
[Formula 17]



[0142] (However, a hydrogen atom or a methyl group is shown by the inside R1 of a formula, and R2 is the alkylene group of carbon numbers 1-10.)

[0143]

[Formula 18]



[0144] (However, a hydrogen atom or a methyl group is shown by the inside R1 of a formula, and R2 is the alkylene group of carbon numbers 1-10.)

An isocyanate radical content unsaturated compound (d1) which was described above as a compound (d) is used. It is made to react to a segment (B) with the precursor polymer which has an alcoholic thru/or phenolic hydroxyl group as a functional group (III). When introducing a partial saturation double bond into the segment (B) of a precursor polymer, the addition of a compound (d) To 1Eq of hydroxyl groups which the segment (B) of a precursor polymer has, it is necessary to adjust so that 0.01-1Eq of isocyanate radicals may serve as a rate of 0.3-1.0Eq more preferably. Namely, to 1Eq of hydroxyl groups, if an isocyanate radical is less than 0.01Eq in rate Cannot introduce the partial saturation double bond of an effective dose into a segment (B), but on the other hand, in case of the rate that an isocyanate radical exceeds 1Eq to 1Eq of hydroxyl groups Neither is desirable, in order that an isocyanate radical may produce aloha shirt NETO association further in response to the refined urethane bond, and desired structure may not be acquired and an unreacted isocyanate radical content unsaturated compound may remain. Moreover, since the fault which a polymerization reaction produces in the partial saturation double bond of an isocyanate radical content unsaturated compound as it is a high temperature service not much, and is gelled as a reaction condition arises, the conditions of 1 - 5 hours at 20-100 degrees C are desirable. In addition, in order to control a polymerization reaction in reaction time which was described above, it is also possible to use a polymerization inhibitor. In addition, unless it has a bad influence on next physical properties, when it is possible, a graft-ized reaction becomes between elevated-temperature durability and a problem arises, using a catalyst for these reactions may use the urethane-ized catalyst usually used, and it may avoid these problems.

[0145] As an option which obtains the graft mold polymer which can be used by this invention For

example, the compound (e) which has the amino group, an amide group, and/or a nitrile group Have this compound and the radical which can react in a segment (A), and it is made to react to the 1st precursor polymer a segment (B) comes to carry out a graft to the segment (A) of a parenthesis. This amino group, An amide group and/or a nitrile group are introduced into this 1st precursor polymer. It considers as a final precursor (precursor polymer of the graft mold which consists of main frame parts of a segment (A) and a segment (B) which have the amino group, an amide group, and/or a nitrile group) which was described above. The approach of introducing the side chain thru/or the extended chain which has a partial saturation double bond in a segment (B) like the account of Gokami can be mentioned.

[0146] The compound which has in intramolecular the compound which has the amino group, an amide group, and/or two or more nitrile groups in intramolecular, the amino group, an amide group and/or a nitrile group, and functional groups other than the amino group as the above-mentioned compound (e), for example can be mentioned.

[0147] However, the above-mentioned functional group can react with the radical concerned which the segment (A) of the aforementioned 1st precursor polymer has and which can react. Although for example, an isocyanate radical, a carboxyl group, hydroxyl, a vinyl group, etc. can be mentioned as a radical which the segment (A) of the 1st precursor polymer has and which can react, the functional group which the above-mentioned segment (B) has needs to be the thing of another kind.

[0148] In addition, it is also possible to introduce the partial saturation double bond to a segment (B) previously, and to perform installation of the amino group to a segment (A), an amide group, and/or a nitrile group after that to said 1st precursor polymer.

[0149] moreover, as an approach of obtaining the polymer of a block type An anion living polymerization method, a cation living polymerization method, iniferter, etc. are known. For example, as an approach of further others In case the radical polymerization of the monomer of a segment (A) or a segment (B) is carried out Make the compound which contains thioester and a thiol group in intramoleculars, such as a thiol carboxylic acid or 2-acetylthio ethyl thiol, and 10-acetylthio decane thiol, live together, and the polymer obtained by carrying out a polymerization is processed with alkali, such as a sodium hydroxide and ammonia. The approach of considering as the polymer which has a thiol group at the piece end, and carrying out the radical polymerization of the monomer component of another segment to the obtained piece end under existence of the polymer which has a thiol group is learned.

[0150] Therefore, in order to obtain the block copolymer concerning this invention Like the case where change suitably a well-known approach which was described above, and said graft copolymer is obtained An amino group which was described above to the part at least as a polymerization nature monomer of a segment (A), The polymerization nature monomer (a) which has an amide group and/or a nitrile group is used. What is necessary is to introduce the amino group, an amide group, and/or a nitrile group into a segment (A) in the case of the polymerization of a block copolymer, or just to introduce such an amino group, an amide group, and/or a nitrile group into a segment (A) after the polymerization of a block copolymer. Also about installation of the partial saturation double bond to the segment in the case of these block copolymers (B), the same technique as the case of said graft copolymer can be used.

[0151] Thus, although not restricted especially about the molecular weight of the graft obtained or a block-type polymer, when the workability of the effectiveness of graft-izing to carbon black and reaction time with carbon black is taken into consideration, as for the above-mentioned molecular weight, it is desirable to consider as the range of average molecular weight 1000-1 million, and it is the range of 5000-100000 more preferably.

[0152] Moreover, although influenced by the class of polymerization chain which is not restricted especially as molecular weight of the segment (A) in a graft or a block-type polymer, and a segment (B), and constitutes these segments etc. A segment (A), considering the field of the graft efficiency to carbon black The range of average molecular weight 300-100000, It is desirable to consider as the range of 5000-50000 more preferably. moreover -- considering the field of the dispersibility reforming effectiveness which it is going to give to carbon black -- a segment (B) -- the range of average molecular weight 500-100000 -- it is more preferably desirable 1000-50000, and to consider as the range of 5000-

30000 still more preferably.

[0153] It is desirable, because can demonstrate high distributed stability especially when the carbon black compound polymer with the comparatively long chain length of said segment (B) which starts this invention as it is the polymer which are 5000 or more good better \*\*\*\*\* further 1000 or more molecular weight preferably is blended with a photo-setting resin constituent etc.

[0154] Furthermore, although not limited especially as the number of the amino group which the segment (A) of a graft or a block-type polymer has, an amide group, and/or nitrile groups, it averages per polymer 1 molecule and it is desirable 50-1, and that it is 20 to about one more preferably.

[0155] Moreover, although not limited especially as the matrix of the partial saturation double bond which a segment (B) has thru/or the purpose medium, and the number of the radicals (II) which can react, it averages per polymer 1 molecule and 20-1, and to have ten to about one more preferably are desired. In addition, the number of radicals (II), such as a double bond per polymer 1 molecule, itself is suitably determined from relation (for example, sensibility, a reflection property, etc.) with media, such as a hardenability constituent with which the carbon black compound polymer obtained is blended. For example, in a black photoresist constituent which is mentioned later, it can strive for maintenance of sensibility by making the number of double bonds which a carbon black compound polymer has increase to lessen the addition of a photoresist monomer.

[0156] In the 1st mode, a graft which was described above, or compound-ization to the carbon black of the polymer of a block type is performed under existence of the dispersion-medium liquid which consists of a medium which has the description near said purpose medium or this to which dispersibility of the carbon black compound polymer obtained tends to be carried out. That is, this dispersion-medium liquid has high compatibility thru/or compatibility to the segment (B) of the polymer concerned, and compatibility thru/or its compatibility are low to a segment (A).

[0157] Therefore, the dispersion-medium liquid used is suitably chosen according to the combination of the segment (A) in the polymer concerned, and a segment (B).

[0158] For example, when it is that in which the segment (A) in a polymer has polystyrene system structure, and a segment (B) has polysiloxane structure, as dispersion-medium liquid used, silicone oil, such as poly dimethylsiloxane, partial octyl permutation poly dimethylsiloxane, partial phenyl permutation poly dimethylsiloxane, and fluoro silicone oil, etc. is desirable.

[0159] Moreover, when it is that in which the segment (A) in a polymer has polystyrene system structure, and a segment (B) has hydrophobic (meta) acrylic structures, such as polymethylmethacrylate, for example, as dispersion-medium liquid used, aprotic polar solvents, such as ketones; pyrrolidones, such as ester; acetones, such as cellosolve; methyl acetate, such as methyl cellosolve and ethylcellosolve, ethyl acetate, and butyl acetate, a methyl ethyl ketone, and methyl isobutyl ketone, N.N-dimethylformamide, and dimethyl sulfoxide, etc. are desirable.

[0160] Moreover, when it is that in which the segment (A) in a polymer has polystyrene system structure, and a segment (B) has hydrophilic (meta) acrylic structures, such as for example, a methyl methacrylate-hydroxymethyl methacrylate copolymer, for example, as dispersion-medium liquid used, ketones; pyrrolidones of alcohols; methyls cellosolve, such as water and water-alcoholic mixture, methyl alcohol, and ethyl alcohol, ethylcellosolve, and butyl cellosolve, such as an ester; acetone, N.N-dimethylformamide, dimethyl sulfoxide, etc. are desirable.

[0161] Moreover, when it is that in which the segment (A) in a polymer has polystyrene system structure, and a segment (B) has for example, polyalkylene glycol system structure, for example, as dispersion-medium liquid used, polyhydric alcohol, such as glycols, such as alcohols; ethylene glycol, such as water and water-alcoholic mixture, methyl alcohol, and ethyl alcohol, and a diethylene glycol, and a glycerol, is desirable.

[0162] Other matter, such as a polymer which does not correspond to this polymer further, and a polymerization nature monomer, can also be made to exist in graft-izing of the carbon black by the bottom of such dispersion-medium liquid existence, and said polymer.

[0163] 0-250degrees C of this compound-ization are preferably performed to the bottom of the temperature of 10-150 degrees C for 0.1 to 5 hours by [ which are mixed preferably for 0.5 to 3 hours ]

carrying out stirring mixing preferably, for example. When the temperature at the time of mixing is less than 0 degree C, there is a possibility of becoming less liquefied, with a solvent, on the other hand, the partial saturation double bond which a segment (B) has when exceeding 250 degrees C may disappear, and it is not desirable.

[0164] What is necessary is to teach said dispersion-medium object to a reactor and just to mix with carbon black and a polymer under a predetermined temperature condition as a procedure of a reaction.

[0165] Although kneading machines, such as a ball mill used for the stirred tank used for the usual stirring or kneading as a reactor, a mixer, and a kneader, can be used The vessel for holding a processed fluid in the interior especially desirably, the stirring child who rotates in the interior of this vessel, They are the heating apparatus for heating the processed fluid held in the interior of vessel, and wet distributed-processing equipment which comes to have two or more granular dispersion-medium objects held in the interior of vessel. The wet distributed-processing equipment thru/or the wet-grinding processor which uses together granular dispersion-medium objects, such as a stirring child and a bead, and performs stirring thru/or a crack is used in this invention as an equipment configuration of adding the heating apparatus for heating a processed fluid to such a processor, although many are known as a well-known thing. If the equipment of such a configuration is used, the carbon black compound polymer which has a particle size small enough very efficient (that is, a polymer compound-izes to the carbon black cracked good from the secondary state of aggregation.) can be obtained.

[0166] Although it cannot generally \*\*\*\*\* since the blending ratio of coal of the carbon black in such graft-izing and said polymer is what is influenced according to the class of said polymer used, the application of the product which it is going to obtain, etc., it is desirable said polymer 1 - the 1000 weight sections, and to consider as 2 - 500 weight section extent more preferably to the carbon black 100 weight section. namely, -- a polymer is under 1 weight section -- the front face of carbon black -- when there is a possibility that it may become difficult to fully reform description and the 1000 weight sections are exceeded on the other hand, the amount of the polymer combined with carbon black increases, and since there is a possibility of spoiling the property of carbon black it is not not only economical, but demanded essentially, it is.

[0167] Next, the manufacture approach of the carbon black compound polymer concerning the 2nd mode is explained.

[0168] the 2nd voice concerned -- the 1st voice which explained above the manufacture approach which starts like in full detail -- it is fundamental almost the same except having made reverse sequence of the manufacture approach which starts like, graft-izing of the polymer part to carbon black, and the introductory process of reactant radicals (II), such as a partial saturation double bond to the segment (A) and/or segment (B) of a polymer. Namely, it sets to the manufacture approach concerning the 2nd mode. This precursor polymer after obtaining the precursor polymer of the block type or graft mold which is having described above from the main frame parts of a segment (A) and a segment (B) which have the amino group, an amide group, and/or a nitrile group similarly, A reactant radical (II) which was described above to the precursor polymer which scattered carbon black a mixed part and was association-ized by carbon black by the ionicity interaction after that under existence of the dispersion-medium liquid which consists of a medium which has the purpose medium or the description near this is introduced.

[0169] As this precursor polymer, in this case, to a segment (A) In addition, the amino group, Have an amide group and/or a nitrile group, and it considers as the thing of structure which has the functional group (III) which does not have reactivity substantially [ the functional group on the front face of carbon black ] in a segment (A) and/or a segment (B). After making carbon black compound-ize this precursor polymer, a compound (d) with the radical (II) which has the functional group (III) which a precursor polymer has, the reactant radical (IV) which can react, the matrix of the purpose medium, and reactivity said precursor polymer -- \*\*\*\* -- it is desirable to adopt the approach of making react to the carbon black it comes-izing [ carbon black ], and introducing said radical (II) into a precursor polymer (in addition in said 1st mode) Since a functional group (III) is substantially consumed before graft-izing with carbon black and a polymer for the installation to the polymer of a reactant radical (II), this

functional group (III) As described above, although it is important that activity is lower than the surface functional group of carbon black, to the amino group which a segment (A) has Since it is necessary to remain in the case of this 2nd mode, without consuming this functional group (III) substantially after graft-izing of carbon black and a precursor polymer, the point that this functional group (III) does not have reactivity substantially [ the functional group on the front face of carbon black ] is more important.

[0170] For example, when introducing the partial saturation double bond radical as a reactant radical (II) into a segment (B) similarly with having illustrated in explanation of the above-mentioned approach of the 1st mode, it sets. After obtaining the precursor polymer of the block type or graft mold which consists of main frame parts of a segment (A) and a segment (B) which have the amino group, an amide group, and/or a nitrile group, What is necessary is just to introduce a partial saturation double bond into the precursor polymer which carried out mixed distribution of this precursor polymer and carbon black, and was compound-ized by carbon black after that using a compound (d) etc., as described above.

[0171] this 2nd voice -- compound-ization to the carbon black of the precursor polymer which can be set like was described above -- as -- said 1st voice -- when there is no limit comparatively rather than the case where it can set like, for example, 0-100 degrees C carries out stirring mixing preferably under the temperature of 0-50 degrees C for 0.5 to 2 hours for 0.1 to 10 hours, it can carry out. Moreover, the introductory conditions of the partial saturation double bond using the compound (d) to the segment (B) of the compound-ized precursor polymer shall not have a limit comparatively, either, for example, it should say that they were 0.5 - 5 hours at 10-100 degrees C. About points other than these, since it is almost the same as that of the thing in said 1st mode, explanation is omitted.

[0172] Next, the manufacture approach of the carbon black compound polymer concerning the 3rd mode is explained.

[0173] Although the manufacture approaches concerning the 3rd mode concerned are the manufacture approach concerning the 1st mode explained in full detail above, and the fundamental almost same thing The amino group in a graft or a block-type polymer which was described above, Carbon black is made to graft-ize the segment (A) which has an amide group and/or a nitrile group using what carried out the molecular design to the purpose medium as what has the compatibility higher than a segment with high compatibility (B) over carbon black.

[0174] Therefore, in the graft-ized system of reaction, such a dispersion-medium object is also comparatively set under absent under the dispersion-medium object of arbitration (except the dispersion-medium liquid which shows extremely high compatibility to the direction of a segment (A)). In order that the segment (A) of this polymer may carry out orientation to a carbon black side, The reactant radical (I) which exists in the segment (A) concerned is effectively compound-ized by the carbon black front face, and the carbon black compound polymer which has the property which was excellent like the case of the 1st invention of the above is obtained.

[0175] It is necessary to make the (A) segment which has the amino group in the graft or block-type polymer used, an amide group, and/or a nitrile group into what has high compatibility to carbon black on the segment chain structure. In addition, since high compatibility here is a relative thing depended on contrast with the (B) segment of another side to the last, by the configuration situation of the (B) segment, the (A) segment can be considered as various kinds of configurations, and cannot generally be \*\*\*\*\*ed). however, the thing to which, as for the aforementioned (A) segment, the principal chain is mainly concerned with carbon-carbon bonding -- more preferably For example, it is what contains rings, such as the benzene ring, a naphthalene ring, and an indene ring, in a principal chain. It shall have in intramolecular a reactant radical (I) which was described above. On the other hand, and the aforementioned (B) segment (A) It is desirable to include many association of those other than carbon-carbon bondings, such as ether linkage, skeletal structure especially with few rings, for example, polysiloxane structure, with less carbon-carbon bonding than a segment or, and an ester bond.

[0176] however, a line moderate since the stiffness of the (A) segment will increase extremely and there is fear with difficult contiguity of the (A) segment on the front face of carbon black at the time of the graft to carbon black, when the (A) segment consists of only advanced condensed multi-ring structures

substantially -- it is desirable to have structure.

[0177] As described above, the chain structure of the (A) segment the chain structure of the (B) segment chosen from the field of the dispersibility which it is going to give to carbon black -- for example, -- said, as carried out Polyether system structures, such as polysiloxane system structure, the Pori (meta) acrylic structure, and a polyalkylene glycol, Polyester system structure, polyalkylene system structure, polyamide structure, polyimide structure, Although not limited especially, that what is necessary is to be determined according to the polymerization chain which has polyurethane structure etc., and just to consider as what has high compatibility to carbon black rather than this generally a vinyl system polymer and the vinyl system monomer component which has a ring especially -- more than 50 mol % -- more preferably more than 60 mol % -- that it is the vinyl system polymer which contains and has a reactivity nature machine mainly concerned with a styrene monomer and (meta) an acrylic monomer, especially if it is desirable and economical efficiency etc. is further taken into consideration -- independent -- it is -- carrying out -- a copolymerization polymer, especially a styrene monomer component -- more than 50 mol % -- further -- more than 60 mol % -- it is the polymerization chain included (it has the above-mentioned reactant radical). In addition, when a segment (B) is a polysiloxane system polymerization chain etc., although there are comparatively many classes of polymerization chain usable as said segment (A), if a segment (B) serves as vinyl system structures, such as for example, the Pori (meta) acrylic structure, as a polymerization chain which can constitute said segment (A), they will be limited considerably and will serve as chisels, such as polystyrene system structure and acrylic (meta)-styrene copolymerization system structure.

[0178] the 3rd voice -- in the manufacture approach which starts like, graft-ization with carbon black and the above-mentioned polymer is performed by stirring-mixing or melting kneading, without making the bottom of existence of the dispersion-medium liquid of arbitration, or such dispersion-medium liquid exist, unless extremely high compatibility is shown for these components in the direction of the segment (A) of the above-mentioned polymer.

[0179] As usable dispersion-medium liquid, although influenced by the configuration of the segment (A) of the polymer concerned For example, water, methyl alcohol, ethyl alcohol, isopropyl alcohol, Alcohols, such as butyl alcohol; A liquid paraffin, Deccan, decene, A methylnaphthalene, a decalin, kerosine, diphenylmethane, toluene, Dimethylbenzene, ethylbenzene, diethylbenzene, propyl benzene, Hydrocarbons, such as a cyclohexane and triphenyl by which partial hydrogenation was carried out; Poly dimethylsiloxane, Partial octyl permutation poly dimethylsiloxane, partial phenyl permutation poly dimethylsiloxane, Silicone oil, such as fluoro silicone oil; A chlorobenzene, Halogenated hydrocarbon, such as a dichlorobenzene, a bromobenzene, a chloro biphenyl, and chlorodiphenyl methane; Die furoyl (Daikin Industries, LTD. make), The fluoride of Demnum (Daikin Industries, LTD. make) etc.; Ethyl benzoate, Ester compounds, such as benzoic-acid octyl, a dioctyl phthalate, trimellitic acid trioctyl, a dibutyl sebacate, bitter taste (meta) chill acid ethyl, butyl acrylate (meta), and acrylic-acid (meta) dodecyl, etc. can be mentioned.

[0180] About the conditions of others at the time of compound-ized processing, it is the same as that of the case of the 1st mode of the above, and the property of the carbon black compound polymer obtained etc. is the same.

[0181] Also in said 2nd mode, the manufacture approach concerning the 4th mode of this invention moreover, similarly After obtaining the precursor polymer of the block type or graft mold which consists of main frame parts of a segment (A) and a segment (B) which have the amino group, an amide group, and/or a nitrile group, To the precursor polymer which carried out mixed distribution of this precursor polymer and carbon black, and was compound-ized by carbon black after that Introduce reactant radicals (II), such as a partial saturation double bond, and also in said 3rd mode similarly The amino group in the polymer (precursor polymer) of a block type or a graft mold, Carbon black is made to compound-ize the segment (A) which has an amide group and/or a nitrile group using what carried out the molecular design as what has the compatibility higher than a segment (B) over carbon black. In addition, although it is almost the same as that of the conditions in the manufacture approach concerning said 3rd mode as various conditions in the approach concerning this 4th mode As reaction temperature conditions at the

time of functional-group (II) installation of the time of compound-izing, a partial saturation double bond, etc., it can consider as a comparatively extensive thing like the case in the manufacture approach concerning said 2nd mode as compared with the thing in the manufacture approach concerning the 3rd mode.

[0182] In the above, the other example is described although this invention has been explained focusing on the case where it has a partial saturation double bond radical about the carbon black compound polymer concerning this invention as a radical (II) which the segment (A) of a graft or a block-type polymer has the amino group, an amide group, and/or a nitrile group, and has the matrix of the purpose medium, and reactivity in a segment (B).

[0183] For example, introducing a carboxyl group into a polymer with the amino group for producing and cheating out of association according [ a radical (II) ] beforehand the case of a carboxyl group to the carboxyl group and ionicity interaction on the front face of carbon black has the difficulty which occurs [ reaction / gelation ].

[0184] An acid anhydride etc. is made to add after making the polymer and carbon black which introduced the hydroxyl group etc. as radicals (III) beforehand react. therefore, a -- By the half esterification reaction of said hydroxyl group and acid anhydride in the graft-ized polymer chain The approach of introducing a carboxyl group and the approach of removing a protective group and introducing a carboxyl group, after making the polymer and carbon black which introduced as radicals (IV) what was blocked by b protective group react are suitable.

[0185] As an acid anhydride used in the approach of a), tetrabasic acid, such as dibasic-acid anhydrides [ , such as phthalic anhydride, succinic-anhydride, maleic-anhydride, tetrahydro phthalic anhydride, hexahydro phthalic anhydride methyl-cyclohexene-dicarboxylic-anhydride, 3, and 6- and methylene tetrahydro phthalic anhydride, methyl and methylene tetrahydro phthalic anhydride, tetrabromo phthalic anhydride, and trimellitic acid, ], aliphatic series, or aromatic series 4 carboxylic-acid 2 anhydride, 2 anhydride etc. is mentioned, and these one sort or two sorts or more can be used.

[0186] The 0.1 to 1.1 chemical equivalent per 1 chemical equivalent hydroxyl group in the polymer which made carbon black compound-ize the amount of the acid anhydride used is suitable, and a reaction condition can be made to react at 50-130 degrees C under existence of polymerization inhibitor, such as hydroquinone and oxygen, or nonexistence under existence of a diluent or nonexistence. On the occasion of the half esterification reaction of this hydroxyl group and an acid anhydride, the common reference 14, for example, a new experimental science lecture, "composition and a reaction (II)" of an organic compound, the Maruzen Co., Ltd. issue, December 20, Showa 52 issue, and a catalyst that is indicated by the 1014th page can be used. As a catalyst, an acid catalyst, a basic catalyst, metal mineral salt, etc. are mentioned. As an acid catalyst, these concomitant use systems, such as a sulfuric acid and p-toluenesulfonic acid, are mentioned. As a basic catalyst, tertiary amine, for example, triethylamine, triethylenediamine, N-pentamethyl ethylene triamine, N, and N-dimethyl benzylamine, N and N-dimethyl URARIRU amine, N and N, N', N'-tetramethyl propylenediamine, These concomitant use systems, such as N-methyl morpholine, N-ethyl morpholine, N, N'-methyl piperazine, pyridine, 4-dimethylaminopyridine, 4-pyrrolidinopyridine, 1, and 8-diazabicyclo-[5, 4, 0]-7-undecene (DBU), are mentioned. As metal mineral salt, these concomitant use systems, such as metaled chlorides, sodium acetate, etc., such as a lithium, a zirconium, a potassium, sodium, tin, zinc, and lead, are mentioned, for example.

[0187] It is possible to use a tetrahydropyranyl group etc. as a protective group to the carboxyl group in the approach of b, on the other hand, for example, although various kinds of things are known. As an example of the blocked monomer which produces an acrylic acid or a methacrylic acid, trimethylsilyl methacrylate, trimethylsilyl acrylate, 1-butoxy ethyl acrylate, 1-ethoxyethyl acrylate, 2-tetrahydropyranyl acrylate, t-butyl methacrylate, 2-tetrahydropiranyl methacrylate, etc. can be illustrated after removal of a protective group.

[0188] moreover, when a radical (II) is a hydroxyl group, as a monomer which constitutes a segment (A) thru/or a segment (B) For example, acrylic-acid hydroxymethyl, acrylic-acid hydroxyethyl, Acrylic-acid hydroxypropyl, acrylic-acid hydroxy 2-ethylhexyl, Methacrylic-acid hydroxymethyl, methacrylic-acid

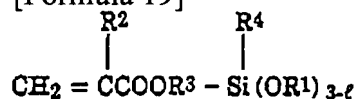


hydroxyethyl, methacrylic-acid hydroxypropyl, An acrylic-acid or methacrylic-acid hydroxyalkyl ester system monomers, such as methacrylic-acid hydroxy 2-ethylhexyl; Hydroxy acrylamide, It is possible to introduce the hydroxyl group concerned into a polymer by using hydroxyalkyl (meta) acrylate, such as hydroxy methacrylamide, etc. for the part at least.

[0189] Moreover, when a radical (II) is an alkoxy silyl radical, it is possible to introduce an alkoxy silyl radical into a polymer by using for the part at least what is expressed with a general formula as shown below as a monomer which constitutes a segment (A).

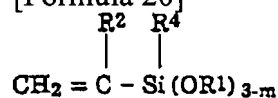
[0190]

[Formula 19]



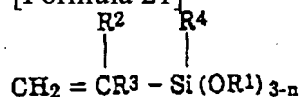
[0191]

[Formula 20]



[0192]

[Formula 21]



[0193] however, the alkyl group by which, as for R<sup>1</sup>, a hydrogen atom, or C<sub>1</sub>-C<sub>5</sub> may be permuted among the above-mentioned formula -- R<sup>2</sup> the organic radical of bivalence, and R<sup>4</sup> for a hydrogen atom or a methyl group, and R<sup>3</sup> A hydrogen atom or an alkyl group, it is the radical which it comes to choose out of a cycloalkyl radical, an aryl group, an aralkyl radical, and an acyl group and which may be permuted, and l, m, and n are 0 or 1 mutually-independent, and even if two or more R<sup>1</sup> in 1 molecule is mutually the same, it may differ.

As an example of an alkoxy silyl radical content monomer shown by the above-mentioned general formula Gamma-methacryloxypropyl trimethoxy silane, gamma-methacryloxypropyl triethoxysilane, Gamma-methacryloxypropylmethyldimethoxysilane, gamma-methacryloxypropylmethyldiethoxysilane, gamma-acryloxypropyltrimethoxysilane, gamma-acryloxypropylmethyldimethoxysilane, Meta-KURIROKISHI ethoxy propyltrimethoxysilane, gamma-methacryloxypropyl phenyl dimethoxysilane, Vinyltrimethoxysilane, vinyltriethoxysilane, vinylmethyldimethoxysilane, There are 1-hexenyl trimethoxysilane, 1-OKUTE nil trimethoxysilane, BINIROKISHI propyltrimethoxysilane, 3-vinyl phenyltrimethoxysilane, 3-(vinylbenzyl aminopropyl) trimethoxysilane, etc.

[0194] In addition, when introducing an alkoxysilane radical into a segment (B), the technique the radical polymerization nature quantity molecular-weight object (b1) which has polysiloxane system structure which was described above, for example uses an alkoxy silyl radical (what is blocked by the protective group is desirable.) may be used.

[0195] Moreover, the radical (II) which has the matrix of the purpose medium which the carbon black compound polymer which it is going to obtain described above, and reactivity is set in the mode which it does not have substantially. Under existence of the dispersion-medium liquid which consists of a medium which has the description near said purpose medium or this to which dispersibility of the carbon black compound polymer obtained tends to be carried out Amino group, What is necessary is just to carry out mixed distribution of the polymer of the block which has the segment (A) which has an amide group and/or a nitrile group, and the segment (B) which shows high compatibility from said segment (A) to said dispersion-medium liquid, or a graft mold, and the carbon black. Or what is necessary is just to carry out mixed distribution of the segment (A) which has the amino group, an amide



group, and/or a nitrile group, and shows high compatibility to carbon black, the polymer of the block which has a segment (B), or a graft mold, and the carbon black.

[0196] Thus, as for especially the mean particle diameter of the carbon black compound polymer concerning this invention obtained, it is desirable that it is within the limits of 0.005-0.2 micrometers 0.001-0.5 micrometers. Since the carbon black from which mean particle diameter serves as a raw material is not obtained easily, a less than 0.001-micrometer carbon black compound polymer has a small industry top meaning. Moreover, sufficient dispersibility may not be acquired when mean particle diameter exceeds 0.5 micrometers.

[0197] As for the rate of a carbon black part and a polymer part, it is [ the carbon black compound polymer of this invention ] especially desirable to the former 100 weight section the latter 1 - the 1000 weight sections, and that it is the 5 - 500 weight section. When the latter is under 1 weight section, the problem that electric insulation and photopolymerization inhibition nature are not improved [ from which the obtained carbon black compound polymers condense, and dispersibility sufficient in the purpose medium is not acquired ] further may arise. Moreover, when the latter exceeds the 1000 weight sections, the polymer part will be graft-ized beyond the need and there is a possibility that the properties of carbon black original, such as coloring nature and protection-from-light nature, cannot be demonstrated.

[0198] In addition to the dispersibility to various matter, for example, an organic macromolecule, water, an organic solvent, etc. being remarkably excellent, and generally electric insulation becoming high, the carbon black compound polymer obtained by approach which was described above will have many properties.

[0199] In the embodiment in which a segment (A) and/or a segment (B) have reactant radicals (II), such as a partial saturation double bond, especially Since a carbon black compound polymer can contribute to the hardening reaction of the medium concerned when it adds to various kinds of media, such as a photo-setting resin constituent and a thermosetting resin constituent Even if it increases the addition of a carbon black compound polymer, hardening reaction sufficient in a short time advances, and it becomes the thing excellent in the degree of hardness in the hardening coat thru/or hardened material obtained, and the distributed stability of carbon black.

[0200] In addition, although it explained previously that it had the effectiveness that the carbon black compound polymer of this invention is similar to a silane coupling agent, about this point, it explains that the silane coupling agent generally known is that from which that action mechanism differs in a detail.

[0201] That is, one organic functional group of a silane coupling agent forms organic (binder) and a reaction, and a general silane coupling agent performs the bridging of the quality of organic, and minerals, while the hydroxyl group (M-OH) on the front face of minerals and the Si-OR radical (alkoxy silyl radical) of a silane coupling agent build oxane association (-M-O-Si-) by hydrolysis. Here, for a Si-OR radical (alkoxy silyl radical), inorganic F-potential tends to react to forward [ so-called ], and it being disadvantageous for application, although rather charged in negative like carbon black, and the ester exchange reaction of the carboxyl group of carbon black and an alkoxy silyl radical are -COO-Si of a product. - Association is very unstable and a reaction on parenchyma is \*\*\*\*\* about difficulty.

[0202] Furthermore, it is thought that there is a problem also in stability with the passage of time since the usual coupling agent does not have the solid stabilizing effect of a dispersed system as compared with a giant molecule block or graft object of this invention although it is low molecular weight comparatively therefore, and the same effectiveness is not expectable even if it uses a silane coupling agent together instead of use the carbon black compound polymer concerning this invention, in case the purpose medium is made to distribute carbon black.

[0203] Moreover, in the carbon black compound polymer of this invention, if the segment (B) in the block thru/or graft mold polymer compound-ized is the thing which has comparatively long chain length, for example, a with a molecular weight of 1000 or more thing When the carbon black complex polymer concerned is blended into the distributed medium made into the purpose, it sets in the matrix of a dispersion-medium object. Since it becomes that whose distributed stability of the segment (B) which

carries out orientation toward the method of outside exists with a wedge-like gestalt, and improves more. When it does not have a reactant radical (II) which was described above but adds to various kinds of media, such as a photo-setting resin constituent and a thermosetting resin constituent, \*\* according to the system, conditions, etc. Even if it compares with the case where it has a reactant radical (II) which was described above, the degree of hardness in the hardening coat thru/or hardened material which is equal in any way, and the distributed stability of carbon black are acquired.

[0204] Furthermore, when [ for example, ] the segment (B) of a polymer is a polysiloxane system structure chain, When water repellence, a mold-release characteristic, thermal resistance, weatherability, flexibility, low viscosity, etc. being excellent and the property that no cold brittleness is are acrylic chains again (meta), various acrylic (meta) ester monomer components are introduced. Especially, when broad hydrophilic-hydrophobicity is a polyalkylene glycol chain further, a hydrophilic property, lubricity, flexibility, and the property of \*\*\*\*\* are given.

[0205] Therefore, it is possible to use this carbon black compound polymer as the coloring agent of well-known thermoplastics and thermosetting resin, a bulking agent, etc. conventionally. When it adds to thermoplastics, it can be used for the toner which has the above-mentioned description, a film, fiber, etc. moreover, the description the same as when this carbon black compound polymer is added to thermosetting resin -- having -- the former -- as carbon -- a problem -- it was -- although -- solution -- it can measure .

[0206] Moreover, there is a covering constituent as an application of the carbon black compound polymer of this invention. What can form a firm coat is desirable by adding to the binder used for a covering constituent, and painting to various bases. Such a binder component is thermoplastics better known than before, thermosetting resin, or reactant resin, and one sort or two sorts or more of such mixture is used by the application.

[0207] Furthermore, for example, by adding this carbon black compound polymer to a photo-setting resin constituent, a black photo-setting resin constituent can be obtained and it can be used especially suitable for the black matrices of a color filter.

[0208] Since it has an ionicity interaction with high surface functional group of carbon black and amino group of the segment (A) in the polymer component of said block or a graft mold, the carbon black compound polymer concerning this invention is compound-ized by the carbon black front face at the effectiveness in which this polymer component is high. For this reason, polymerization inhibition nature functional groups which exist on the surface of carbon black, such as a quinone radical and a phenolic hydroxyl group, are covered, and photo-curing delay of a photo-setting resin constituent is controlled. Moreover, in order that the segment (B) in said polymer may carry out orientation of the graft carbon black obtained outside, compatibility with various matter is improved, the dispersibility to various photo-setting resin constituents is excellent, and since it has still better lubricity, moderate viscosity will be demonstrated when it is made to distribute to a photo-setting resin constituent. In addition, said polymer part and when a partial saturation double bond exists in a segment (B) as a reactant radical (II) more preferably, it will contribute also to photopolymerization thru/or optical crosslinking reaction, and can be suitably used as a coloring agent in UV coating, UV ink, the photo-setting resin constituent for color filters, etc.

[0209] The same thing as the various presentations used in such [ conventionally ] a field as a photo-setting resin constituent which blends such a carbon black compound polymer as a coloring agent thru/or a protection-from-light agent can be used, and the monomer in which optical bridge formation or photopolymerization is possible, oligomer, and/or a prepolymer may be contained. Moreover, photo-setting resin constituents may be any of oleophilic and/or a hydrophilic property, and the good dispersibility of carbon black is acquired by \*\*\*\*ing the property of the segment (B) in the polymer of the block or graft mold used for composition of the above mentioned carbon black compound polymer with the property of a photo-setting resin constituent.

[0210] As a monomer, ethylene glycol diacrylate, ethylene glycol methacrylate, Polyethylene-glycol acrylate, polyethylene-glycol methacrylate, Polyethylene-glycol diacrylate, poly ethylene glycol dimethacrylate, Neopentyl glycol acrylate, neopentyl glycol methacrylate, 1,6-hexanediol diacrylate,

trimethylolpropane triacrylate, Trimethylolpropane tri-methacrylate, pentaerythritol tetraacrylate, Dipentaerythritol hexaacrylate, beta-hydroxyalkyl acrylate, beta-hydroxyalkyl methacrylate, a triaryl SHIANU rate, Triallyl isocyanurate, diallyl phthalate, diallyl isophthalate, Melamine acrylate, butoxy ethyl acrylate, stearylacrylate, Laurylacrylate, tetra-hydroxy acrylate, tetra-hydroxy methacrylate, Amino alkyl acrylate, aminoalkylmetaacrylate, triethylene glycol diacrylate, Triethylene glycol dimethacrylate, dipropylene glycol diacrylate, A pentaerythritol thoria chestnut rate, pentaerythritoltrimetaacrylate, 1, 5-PENTA diol diacrylate, isobornyl acrylate, Glycerol diacrylate, glycerol dimethacrylate, glycerol AKUROKISHIJI methacrylate, Ethyl carbitol acrylate, methyl TORIGU recall acrylate, 2-hydroxyethyl acryloyl phosphate, an N-vinyl-2-pyrrolidone, Ethylene nature unsaturated compounds, such as acrylamide, N-methylol acrylamide, N-n-butoxy methyl acrylamide, N-(1 and 1-dimethyl-3-oxo-butyl) acrylamide, and an itaconic acid, can be used.

[0211] moreover, as oligomer thru/or a prepolymer For example, the polyester and the unsaturated polyester resin which permuted the active hydrogen atom of polyol by the acryloyl radical or the meta-acryloyl radical, The vinyl copolymer and glycidyl acrylate which use a drying-oil denaturation alkyd resin, an acrylic acid, and the unsaturated carboxylic acid like a methacrylic acid as a copolymerization component, An addition product with the acrylic monomer which has an epoxy group like glycidyl methacrylate, The addition product of the vinyl copolymer and unsaturated carboxylic acid which use as a copolymerization component the acrylic monomer which has an epoxy group, Tolylene diisocyanate, the addition product of a HEKINIRU copolymer and unsaturated carboxylic acid, An addition product with tolylene diisocyanate, hexamethylene diisocyanate, two mols of tolylene diisocyanates, and the acrylic monomer that has an isocyanate radical at the end like an one mol [ of ethylene glycol ] addition product etc. can be mentioned.

[0212] Moreover, in a photo-setting resin constituent, it is also possible to add a photosensitizer if needed. Or two or more sorts can be combined and \*\* can be used. one sort of what [ various kinds of ] is conventionally well-known as a photosensitizer -- For example, a thioxan ton, a benzoin, benzoin ethyl ether, Benzoin isobutyl ether, xanthone, dimethyl xanthone, Benzophenone, anthracene, 2, and 2-diethoxy acetophenone, Benzyl dimethyl ketal, benzyl, diphenyl disulfide, anthraquinone, 1-clo RUANTORAA quinone, 2-ethyl anthraquinone, 2-t-butyl anthraquinone, Methyl anthraquinone, 1-KURORU methyl naphthalene, N, N'-tetraethyl -4, 4'-diamino benzophenone, dibenzo SUPARON, 1, and 1-dichloro acetophenone etc. is mentioned.

[0213] Moreover, it is possible to blend the organic macromolecule polymer which has compatibility in the above photopolymerization nature compounds as a film-forming component into a photo-setting resin constituent if needed. As such an organic macromolecule polymer, polyacrylic ester or its partial hydrolysate, Pori methacrylic acid ester or its partial adding-water object, polyvinyl acetate, or its hydrolyzate, A copolymer or half ester of polystyrene, a polyvinyl butyral, polychloroprene, a polyvinyl chloride, chlorinated polyethylene, chlorination polypropylene, a polyvinyl pyrrolidone, styrene, and a maleic anhydride etc. is mentioned. Within limits which do not check a photoresist, moreover, for example, methyl alcohol, ethyl alcohol, Amides, such as lower alcohol, such as butyl alcohol, and dimethylformamide Ester, such as methyl acetate, ethyl acetate, and butyl acetate, the 2-ethylhexyl ether, Ether, such as dioxane, ethylene glycol, and the monomethyl ether, Furans, such as 2-methyl tetrahydrofuran and a furfural, chloroform, Halogenated compounds, such as methyl chloroform and trichloroethylene, n-hexane, Suitable organic solvents, such as sulfur derivatives, such as nitril, such as ketones, such as aliphatic hydrocarbon like n-heptane, an acetone, a methyl ethyl ketone, and methyl isobutyl ketone, an acetonitrile, and dodecyl nitril, a carbon disulfide, and a thiophene, may be added. Moreover, in order [ in photo-curing ] to carry out fault reaction prevention, polymerization retarders, such as hydroquinone and para benzoquinone, can be added if needed. Furthermore, it is also arbitrary to add other well-known additive, for example, thickener, thixotropic grant agents, leveling material, defoaming agents, adhesion grant agents, etc.

[0214] It is desirable for its graft carbon black to be the thing of a photo-setting resin constituent in which it is contained five to 60% of the weight more preferably one to 80% of the weight, although the loadings in the photo-setting resin constituent of a carbon black compound polymer although the black

photo-setting resin constituent of this invention comes to blend a carbon black compound polymer which was described above into a photo-setting resin constituent are influenced by the class of photo-setting resin constituent used. That is, it is because there is a possibility that photographic density may fall that the loadings of a carbon black compound polymer are less than 1 % of the weight and there is a possibility that the reinforcement of a coat may fall that it is a thing exceeding 80 % of the weight on the other hand.

[0215] Moreover, although what is used for the applications for color filters etc. among the black photo-setting resin constituents of this invention may consider as the thing of an alkali meltable mold, in such a mode, to be a thing containing alkali meltable mold resin is desired.

[0216] The photoresist constituent in which alkali development is possible consists of a polymer binder which has a photopolymerization initiator, polyfunctional monomer, and an alkali meltable radical in a molecule fundamentally, if light is irradiated, it will be hardened, and it is insolubilized in an alkali water solution.

[0217] The following can be mentioned if it considers as the binder which may be blended with the alkali meltable mold photoresist constituent suitable for using as a sensitization layer containing a carbon black compound polymer which was described above in which alkali development is possible.

[0218] Styrene / acrylic-acid copolymer, styrene / methacrylic-acid copolymer, Alkali meltable mold resin containing styrene, such as styrene / alpha methyl styrene / acrylic-acid copolymer; Benzyl acrylate / acrylic-acid copolymer, Benzyl acrylate / methacrylic-acid copolymer, benzyl methacrylate / acrylic-acid copolymer, The repeating unit drawn from at least one sort of compounds chosen from the group which consists of an acrylic acid and methacrylic acids, such as benzyl methacrylate / methacrylic-acid copolymer, And (B) benzyl acrylate, benzyl methacrylate, phenethyl acrylate, Phenethyl methacrylate, 3-phenylpropyl acrylate And alkali meltable mold resin which has the repeating unit drawn from at least one sort of compounds chosen from the group which becomes if it is 3-phenylpropyl methacrylate; A methyl methacrylate / 2-ethylhexyl methacrylate / (meta) acrylic-acid ternary polymerization object, A methyl methacrylate / styrene / ethyl acrylate / (meta) acrylic-acid quarterpolymer, Alkali meltable mold resin containing methyl methacrylates, such as a ternary polymerization object of a methyl methacrylate / ethyl acrylate / (meta) acrylic acid; the acrylonitrile of acrylonitrile / 2-ethylhexyl methacrylate / methacrylic acid, such as a 3 yuan copolymer Alkali meltable mold resin to contain; Styrene / maleic-acid Monod n-butylester copolymer, Alkali meltable mold resin in which maleic-acid anhydrides, such as a polymer in which styrene / maleic-acid anhydride copolymer carried out half esterification the part, carried out half esterification; what combined these in addition to this can be added to the photoresist constituent concerned.

[0219] On various base materials, such as a glass plate, a sheet plastic or a film, paper, a synthetic paper, and a silicon wafer, after applying the black photo-setting resin constituent of this invention by the methods of application, such as a bar coating machine, a spin coater, a roll coater, spray painting, dipping, gravure, and screen-stencil, it can form a black coat by carrying out a 10-5000mJ exposure and stiffening ultraviolet rays.

[0220] When forming the black matrix in a color filter using the black photo-setting resin constituent of this invention furthermore, it is carried out as follows, for example.

[0221] This black photo-setting resin constituent is applied to substrates, such as a glass plate, by a spin coater etc., and, subsequently grade desiccation (prebake) of the 150 degrees C or less of this paint film is especially carried out for 1 - 60 minutes at 80-120 degrees C with an air forced oven, a hot plate, etc. In addition, as for the coat of the black photo-setting resin constituent obtained by this, it is usually desirable that it is about about 1.0-3.0 micrometers. Then, after sticking the mask of predetermined configurations, such as a dot pattern and a stripe pattern, letting this mask pass, for example, carrying out the 50-1000mJ exposure of the parallel ray and carrying out pattern exposure from sources of ultraviolet radiation, such as a high pressure mercury vapor lamp, negatives are developed to the coat of this black photo-setting resin constituent, and patterns, such as a black matrix, are formed in it.

[0222] The development of a coat by which pattern exposure was carried out is immersed in a suitable developer under the temperature of about 0-100 degrees C in this coat, and is performed by being eluted

and removing a part for the non-hard spot of this coat. It is desirable to carry out the rinse of the formed coloring pixel by the suitable penetrant remover, to carry out grade heat treatment (after-bake) for 1 - 120 minutes, and to carry out full hardening of the coloring pixel at about 100-300 degrees C, with an air forced oven, a hot plate, etc. subsequently, after development.

[0223] In addition, as described above, when the carbon black compound polymer concerning this invention is what has a partial saturation double bond as a reactant radical (II), it can combine with the resin matrix which forms a coat at the time of exposure through the bridge formation thru/or the polymerization chain generated according to an operation of the partial saturation double bond concerned. For this reason, even if it performs the above after-bake after that, the distributed condition of the carbon black which exists in a coat is held at stability, and the fault that electrical resistivity falls by performing after-bake is not seen.

[0224] Either of the approach of facing forming the black matrix in a color filter using the black photo-setting resin constituent concerning this invention, and forming a black matrix previously on a substrate, and forming red, green, and the coloring pattern of blue each color previously after that on red, green, the approach of forming the coloring pattern of blue each color, or a substrate, and forming a black matrix after that is possible.

[0225] Moreover, carbon black is carrying out micro distribution of the carbon black compound polymer concerning this invention, and it can come out of these carbon black dispersion liquid as it is as ink excellent in tinting strength with the thing for an oily note which the liquid phase was made to distribute, i.e., an object, the object for information record, or the distributed stability for printing suitable [ as a coloring agent / for various applications ] and sufficient, or a required component can be suitably added and used for it.

[0226] Moreover, the carbon black compound polymer dispersion liquid of this invention can be used for plating, thermal-ink-transfer-printing ink, a coating, etc. Moreover, since it has the above-mentioned description, it can be used for the ink ribbon coat agent for thermal ink transfer printing, a magnetic-recording medium, etc. Furthermore, there are for example, an electric resistance regulator, an antistatic agent, encapsulant for semiconductor devices, a planar heating element, etc. as an application in the form where resistance was adjusted.

[0227] What is necessary is it to be possible to use for formation of the conductive layer formed in the roll base material front face of the electrification roll in electrophotography devices, such as a copying machine, a printer, and facsimile apparatus, and to blend the carbon black dispersion liquid concerning this invention into a suitable binder solution, to apply this to a roll base material front face, and just to carry out coat formation as an electric resistance regulator, for example.

[0228]

[Example] Hereafter, although an example explains this invention concretely, this invention is not limited to these examples.

[0229] The 75 sections and styrene were dissolved in the 15 sections, and the azo-isobutyro-dinitrile 3 section was dissolved [ the macro monomer (the product made from Toagosei Chemical industry, AA714 Poly (MMA/HEMA), MMA:HEMA=86:14) which has a synthetic 1 piece of example end METAKU roil radical (methyl methacrylate/hydroxyethyl methacrylate) ] for dimethylaminoethyl methacrylate in the propylene-glycol-monomethyl-ether acetate solvent (it is hereafter written as PGM-Ac.) 150 section as the ten sections and an initiator.

[0230] The polymer (1) which cools after teaching the above-mentioned monomer constituent to the separable flask equipped with an impeller, inert gas installation tubing, the reflux cooling pipe, the thermometer, and the tap funnel, performing a polymerization reaction at 80 degrees C for 4 hours, heating at 110 more degrees C for 2 hours and performing polymerization aging, and has the 3rd class amino group of 40% of nonvolatile matters was obtained.

[0231] Subsequently, the carbon black (Mitsubishi Chemical make, MA-8) 30 section, the polymer (1) solution 22.5 above-mentioned section, and the PGM-Ac97.5 section were taught to the separable flask equipped with the thermometer, the impeller, and the cooling pipe, respectively, and carbon black was familiarized with it. Then, the bead 750 made from a zirconia section was taught in the flask, and

decentralization processing was carried out by rotational frequency 750rpm. Then, the PGM-Ac50 section was added, the bead made from a zirconia was separated, and the carbon black dispersing element (1) was obtained.

[0232] To the polymer (1) obtained in the example 1 of synthetic example 2 composition, churning was continued for the METAKU roil isocyanate (molecular weight 111.1) 8.9 section after dropping at the room temperature (25 degrees C \*\*5 degrees C) over for 30 minutes for 1 hour, and the polymer (2) solution which has the double bond of 43.6% of nonvolatile matters was obtained.

[0233] Subsequently, the carbon black (Mitsubishi Chemical make, MA-8) 30 section, the polymer (2) solution 20.6 above-mentioned section, and the PGM-Ac108.4 section were taught to the separable flask equipped with the thermometer, the impeller, and the cooling pipe, respectively, and carbon black was familiarized with it. Then, the bead 750 made from a zirconia section was continuously taught in the flask, and decentralization processing was carried out by rotational frequency 750rpm. Then, the PGM-Ac50 section was added, the bead made from a zirconia was separated, and the carbon black dispersing element (2) which has a double bond was obtained.

[0234] After having taught the same separable flask as what used in the azo-isobutyro-dinitrile 3 section as the example of comparison composition 1 methyl-methacrylate 64.5 section, the hydroxyethyl methacrylate 10.5 section, the styrene 15 section, the dimethylaminoethyl methacrylate 10 section, and an initiator, and used the PGM-Ac150 section in the synthetic example 1 as a solvent, having performed the polymerization reaction for 4 hours, heating at 110 more degrees C for 2 hours and performing polymerization aging, the polymer for a comparison (C1) which has the 3rd class amino group of 40% of nonvolatile matters was obtained.

[0235] Subsequently, the 22.5 sections and the PGM-Ac97.5 section were taught to the same separable flask as the synthetic example 1, respectively for the carbon black (Mitsubishi Chemical make, MA-8) 30 section and the above-mentioned polymer for a comparison (C1), and carbon black was familiarized with it. Then, the bead 750 made from a zirconia section was taught in the flask, and decentralization processing was carried out by rotational frequency 750rpm. Then, the PGM-Ac50 section was added, the bead made from a zirconia was separated, and the carbon black dispersing element for a comparison (C1) was obtained.

[0236] It is the JON krill 68 (the IRGACURE 907 (Ciba-Geigy make) 9.38 section was added as the 21.25 made from Johnson Polymer sections, the dipentaerythritol hexaacrylate 62.5 section, and a photoinitiator, homogeneity distribution was carried out, and the black photoresist constituent (1) was obtained.) as a binder to the carbon black dispersing element (1) 50 section obtained in the example 1 of the example 1 above-mentioned composition.

[0237] The black photoresist constituent (1) was applied by the spinner so that desiccation thickness might be set to 0.5 micrometers, and it carried out prebake on the hot plate for 1 minute at 100 degrees C. The high pressure mercury vapor lamp performed ultraviolet-rays exposure of 800 mJ/cm<sup>2</sup>, and the obtained coat was stiffened. And the surface-electrical-resistance value after ultraviolet-rays exposure was measured. Then, after-bake was performed on oven at 200 degrees C, and the surface-electrical-resistance value change was investigated with elapsed time. The obtained result is shown in Table 1. In addition, surface-electrical-resistance value measurement was measured with surface-electrical-resistance measuring device Huy Lester IP / MCP-HT260 mold.

[0238] In example 2 example 1, except using a carbon black dispersing element (2) instead of a carbon black dispersing element (1), the completely same actuation as an example 1 was repeated, the black photoresist constituent (2) was obtained, and the surface-electrical-resistance value change was investigated by the still more nearly same approach. The obtained result is shown in Table 1.

[0239] In example of comparison 1 example 1, except using the carbon black dispersing element for a comparison (C1) instead of a carbon black dispersing element (1), the completely same actuation as an example 1 was repeated, the black photoresist constituent for a comparison (C1) was obtained, and the surface-electrical-resistance value change was investigated by the still more nearly same approach. The obtained result is shown in Table 1.

[0240]

[Table 1]

キュア時間	0	90	180	300
実施例 1	OR	$9.91 \times 10^{11}$	$2.26 \times 10^{11}$	$8.15 \times 10^{10}$
実施例 2	OR	OR	OR	OR
比較例 1	$10^5$	$<10^4$	$<10^4$	$<10^4$

キュア温度：200℃

キュア時間単位：分

表面抵抗値単位： $\Omega/\square$

OR：オーバーレンジ  $10^{12}$ 以上を示す。

[0241] It turned out that it becomes the coat which was excellent, without resistance falling with heating in the thing of the block type in which the polymer in the used carbon black dispersing element has an amino group, and the thing which has the double bond as shown in Table 1.

[0242] Except having made to be in the example 1 of synthetic example 3 composition with the carbon black 30 section, the polymer (1) solution 22.5 above-mentioned section, and the PGM-Ac97.5 section into the carbon black 30 section, the polymer (1) solution 30 above-mentioned section, and the PGM-Ac90 section, the completely same actuation as the synthetic example 1 was performed, and the carbon black dispersing element (3) was obtained.

[0243] As opposed to the example 3 AROSETTO 5271 (NIPPON SHOKUBAI Co., Ltd. make, acrylic binder solution, 50% of nonvolatile matters) 182 section the carbon black dispersing element (1) 200 section (carbon black -- the 30 section) As opposed to the black resin liquid (1) which consists of the polymer part 9 sections, and the AROSETTO 5271 (NIPPON SHOKUBAI Co., Ltd. make, acrylic binder solution, 50% of nonvolatile matters) 176 section The black resin liquid (3) which consists of the carbon black dispersing element (3) 200 section (carbon black 30 section, polymer part 12 sections) was prepared.

[0244] After having applied each black resin liquid to the glass substrate, making tapetum nigrum form and volatilizing a solvent using an applicator, the surface-electrical-resistance value was measured. Consequently, in identitas carbon black content 30PHR, the paint film formed from black resin liquid (1) is the order of 107ohms / \*\*, and, as for the paint film formed from black resin liquid (3), the order of 108ohms / \*\* was shown.

[0245] The azo-isobutyro-dinitrile 3 section was dissolved in the PGM-Ac150 section as the macro monomer (product [ made from Toagosei Chemical industry ], AA714) 50 section used in the example 1 of synthetic example 4 composition, the styrene 15 section, the dimethylamino ethyl acrylate 5 section, the 2-hydroxyethyl methacrylate 20 section, and an initiator.

[0246] The above-mentioned monomer constituent was taught to the same separable flask as the synthetic example 1, the polymerization reaction was carried out at 80 degrees C for 4 hours, polymerization aging was performed at 110 more degrees C for 2 hours, and the polymer (2) which has the 3rd class amino group of 40% of volatile matter was obtained.

[0247] Subsequently, like the synthetic example 1, the carbon black (Mitsubishi Chemical make, MA-8) 20 section, the polymer (2) solution 22.5 above-mentioned section, and the PGM-Ac97.5 section were taught, respectively, and carbon black was familiarized. Then, the bead 750 made from a zirconia section was continuously taught in the flask, and decentralization processing was carried out by rotational frequency 750rpm. Then, the PGM-Ac50 section was added, the bead made from a zirconia was separated, and the carbon black dispersing element (4) was obtained.

[0248] The trimellitic anhydride (molecular weight 192.13) 3.59 section was dissolved to the carbon black dispersing element (4) 150 section obtained in the example 4 of synthetic example 5 composition.

[0249] Subsequently, the above-mentioned dispersion liquid were taught to the separable flask equipped with the thermometer, the impeller, the cooling pipe, and the tap funnel, the 1 and 8-diazabicyclo [5, 4, 0] 0.09 section was taught to the tap funnel, it added over 30 minutes, the reaction was performed at the temperature of 80 degrees C for 1 hour, and the carbon black dispersing element (5) containing a carboxyl group was obtained.



[0250] In addition, an alkali fusibility photoresist constituent (4) and (5) were obtained to the carbon black dispersing element (4) obtained by the example 4, the example of 5 composition (4), and (5), and (5) by the blending ratio of coal which shows dipentaerythritol triacrylate as a photoresist monomer and shows alkali meltable mold styrene-acrylic resin (the JON krill 68, product made from Johnson Polymer) in Table 2 as a binder, respectively.

[0251] This solution was applied by the spinner so that desiccation thickness might be set to 1 micrometer on a glass substrate, and prebake was carried out for 1 minute at 100 degrees C. when viewing estimates the film which develops negatives using a NaOH water solution 0.5%, and remains the obtained dry paint film, with a photoresist constituent (4), black residue boils only the photoresist constituent (5) prepared by the carbon black dispersing element (5) which is carbon black complex polymer content dispersion liquid with a COOH radical on a glass substrate to the all clear field having come out on the glass substrate -- he was fastidious.

[0252]

[Table 2]

	カーボンブラック 分散液		アルカリ 可溶樹脂	光硬化性 モノマー
光硬化性組成物(4)	(4)	500重量部	30重量部	40重量部
光硬化性組成物(5)	(5)	513重量部	18重量部	40重量部

[0253]

[Effect of the Invention] As stated above, since this invention is a carbon black compound polymer which is made to carry out mixed distribution of the polymer of the block which consists of a segment (B) of different structure from the segment (A) which has the amino group, an amide group, and/or a nitrile group, and said segment (A), or a graft mold, and the carbon black, and is obtained, while it has high carbon black content, it is excellent in the dispersibility to various media.

[0254] And since compound-ization with carbon black and a polymer part is what is made by association by the ionicity interaction of the amino group, an amide group and/or a nitrile group, and the functional group on the front face of carbon black, as compared with the case where it graft-izes through covalent bond, there are few problems of the safety on manufacture, limits of a reaction condition, etc., and they are industrial more advantageous.

[0255] Furthermore, if said segment (A) and/or (B) have the radical (II) which has the matrix of the purpose medium which blends this carbon black compound polymer, and reactivity [ when it becomes that from which the more excellent distributed stability is acquired, in addition adds to various light thru/or a thermosetting resin constituent ] It can contribute to hardening of the resin constituent concerned, a high intensity coat can be easily formed also as a high addition, the coat excellent in protection-from-light nature and photographic density can be obtained, and it excels also in many physical properties, such as electric insulation, further. For this reason, it may be preferably added by the photo-setting resin constituent which can add to various media including light thru/or a thermosetting resin constituent which was described above suitably as applications, such as a coloring agent, a bulking agent, and a protection-from-light agent, and is especially used for them at the charge of black matrix formation material of a color filter. Furthermore, in the mode which does not remain in what raises the physical properties acquired, for example, is used for the application of the resin black matrix for color filters at the radical (II) which has the matrix of the purpose medium and reactivity not necessarily reacting with a matrix, depending on the use mode, additional effectiveness may be acquired as the COOH radical as a radical which has a matrix and reactivity raises alkali development property.

[0256] Moreover, it is especially suitable for formation of the black matrix of a color filter from the



ability of a high film strength and high electric resistance nature for the coat formed with the photo-setting resin constituent which comes to add the carbon black compound polymer concerning this invention to demonstrate protection-from-light nature high at thickness thin enough, and to be demonstrated.

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[Translation done.]